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NONPOINT SOURCE MANAGEMENT PLAN

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MASSACHUSETTS

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NONPOINT SOURCE MANAGEMENT PLAN

I. Introduction

A. Purpose of Plan.

The nonpoint source management plan proposes an orderly and progressive approach to prevent continued degradation of Massachusetts surface and ground waters due to nonpoint sources and to develop restorative actions of waters where impacts from nonpoint sources have been observed. The plan should be viewed as a part of a comprehensive statewide clean water strategy intended to protect drinking water supplies, fish and shellfish, wetlands, wildlife habitat, recreation areas, open space, and physical shoreline features. The range and type of known nonpoint source water quality problems have been identified in a statewide assessment report (Commonwealth of Massachusetts, Summary of Water Quality, 1988). The Commonwealth of Massachusetts recognizes the need to protect the quality and biological health of its waters, and, while clear, scientific evidence does not always exist to define the size and effects of nonpoint inputs, our knowledge is sufficient to identify the need for a control program in order to develop priorities and to begin source control efforts.

This plan is a dynamic strategy which the Commonwealth intends to implement over the next four years. It will be updated and reevaluated on a regular basis. The plan recognizes the complex nature of the issues and emphasizes the importance of prevention, as well as clean up, due to the extensive costs of restoration. The need for continued scientific research and monitoring is identified. Because of the diversity and magnitude of the problems, there is a critical need for networking and sharing of responsibilities among the many state, regional, and local groups, as well as interstate cooperation, since watersheds and nonpoint problems cross political boundaries. The fundamental responsibility, however, will fall to state and local governments, and the purpose of the plan is to organize a rational, cooperative approach as implemented by the Division of Water Pollution Control in the Massachusetts Department of Environmental Quality Engineering.

For the purposes of this plan the definition of nonpoint source pollution will be the same as that used by the U.S. Environmental Protection Agency (U.S. EPA, Nonpoint Source Guidance, December, 1987):

> Nonpoint Source (NPS) Pollution: NPS pollution is caused by diffuse sources that are not regulated as point sources and normally is associated with agricultural, silviculture and urban runoff, runoff from construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological, and radiological integrity of water. In practical terms, nonpoint source pollution does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition, or percolation. It must be kept in mind that this definition is necessarily general; legal and regulatory decisions have sometimes resulted in certain sources being assigned to either

> the point or nonpoint source categories because of considerations other than their manner of discharge. For example, irrigation return flows are designated as "nonpoint sources" by section 402(1) of the Clean Water Act, even though the discharge is through a discrete conveyance.

The management plan sets forth a logical agenda for both short and long-term strategies and develops a program to address nonpoint source controls and land use management.

B. Objectives of Plan.

1. The main objective of the nonpoint management plan is to develop the framework for a statewide networked program which will draw on the expertise and skills of various state, regional, and local agencies and which will coordinate their efforts to implement best management practices to restore and protect the water quality and biological health of our state's waters. The program will focus on implementation, including the use of land use management and acquisition, source control, remedial actions, and water quality standards. Pro-active planning and management by all agencies will be emphasized, building on the efforts of the 208 planning process. The management plan will use the developed framework to set priorities and to establish procedures for implementing nonpoint source strategies on a statewide basis.

2. Major efforts are needed to identify the best techniques and management tools for achieving and quantifying measurable protection of water resources. Strategies and methods should be carefully analyzed, and areas where additional research is needed should be recommended. Considerable emphasis will be placed on regulating land use. Coordination with the skills and resources of the various agencies is essential.

3. Another objective of the plan is to emphasize efforts to achieve a visible, perceptible, or tangible improvement in water quality in areas where impacts from nonpoint sources have been observed or where they are likely to be having detrimental effects. The complex nature of nonpoint pollution, as well as the frequent high cost of remedial actions will require the support of the general public, which will only be achieved with the attainment of results that are both demonstrable and comprehensible. Public education and involvement will be required to understand the significance of the disappearance of algal mats, the reinstatement of swimming, the opening of shellfish areas, and other real and related improvements in water quality and will be critical to the success of the program. For this reason there will be definite goals associated with implementation projects which may include achievement of water quality standards, reduction of nonpoint pollutant concentrations or loadings, restoration of biological resources, recreational and economic use and similar goals.

C. Massachusetts Groundwater Strategy

The Massachusetts Nonpoint Source Management Plan recognizes that "surface water" and "groundwater" cannot be treated as separate entities but must be considered together as an integrated hydrologic system or cycle. The Massachusetts plan stresses the importance of groundwater protection and appreciates the same emphasis shown in the federal Nonpoint Source Program (Section 319 of the Clean Water Act). Because of groundwater's importance the following section is included in the nonpoint source management plan to show that a definite and determined effort is underway to formulate and implement a cohesive state groundwater strategy. It has been only fairly recently that the potential impact of nonpoint sources of pollution on groundwater has been recognized. Issues such as pesticide use, underground storage tanks, Cape Cod's sole source aquifer, high sodium levels from road salt, hazardous wastes and public water supplies and many others have dramatically illustrated the connection between nonpoint source pollution and groundwater quality. This groundwater strategy section of the plan has been researched and written by staff of the Water Resources Commission (WRC) and Executive Office of Environmental Affairs (EOEA). The members of the WRC represent the top leadership of EOEA, the Executive Office of Communities and Development and six public members. The WRC has created a Water Supply Task Force. The task force was expanded to include the Departments of Health, Public Works, Public Safety and the Special Legislative Commission on Water Supply to develop the state's groundwater protection strategy. To better visualize what you just read, the following is offered:

DEVELOPMENT OF MASSACHUSETTS GROUNDWATER PROTECTION STRATEGY

MASSACHUSETTS WATER RESOURCES COMMISSION
Designated as coordinating body

EOEA Agencies

Department of Environmental Management
Department of Environmental Quality Engineering
Department of Food and Agriculture
Metropolitan District Commission
Department of Fisheries, Wildlife and Environmental Law Enforcement

Executive Office of Communities and Development

Public Members

Recreation
Industry
Labor
Water Supplies
Agriculture
Well Drillers

WRC WATER SUPPLY TASK FORCE
EOEA Agencies, department representatives
Requested to draft strategy

Membership of task force has been expanded for this task to include:

Exec. Office of Communities and Development (planning, grants)
Department of Public Health (testing, research, boards of health)
Department of Public Works (road salt, infrastructure, construction)

Department of Public Safety (UST's)
Special Legislative Commission on Water Supply (research, legislation)
EPA (analysis)

This groundwater strategy is a subset of the overall nonpoint source management plan. Many of the agency tasks recommended for implementation are echoed under Section III, The Plan. The groundwater strategy will be coordinated by the Water Resources Commission. The parallel purposes will help ensure successful implementation. Staff from the nonpoint source program will help and assist the WRC as necessary to complete the groundwater strategy in a manner consistent with the nonpoint management plan.

One important aspect of nonpoint source pollution is addressed under this groundwater strategy: pesticides. The use and storage of pesticides can and has had an impact on groundwater in Massachusetts. Pesticides do perform a valuable function in agriculture but they must be used and stored in a judicious and responsible fashion. The Department of Food and Agriculture is now in the process of evaluating the situation and has been charged with completing several tasks relative to this issue (see Section I.C.3 of this groundwater strategy under Dept. of Food and Agriculture). These tasks will be implemented as part of this groundwater strategy.

1. Introduction and Background

Of the 351 cities and towns in Massachusetts, 275 rely on groundwater sources for drinking water. This equates to approximately 34% of Massachusetts' population. The groundwater resource in Massachusetts is threatened by increasing pressures from urbanization, industrialization, the need for more water, and existing and continuing threats once thought harmless (such as underground storage tanks). The topic of groundwater protection and conservation began to emerge in the 1970's as one of considerable significance in Massachusetts. Groundwater quality protection was recognized as one of the primary concerns in the 1980's. In 1980, the Massachusetts Water Resources Commission (WRC) adopted a goal for groundwater protection. This goal, "to protect the quality and quantity of groundwater to the level necessary for projected future use" is the foundation for the development of groundwater protection programs and actions in Massachusetts.

The Department of Environmental Quality Engineering is charged with ensuring the quality of all waters in the Commonwealth, including groundwater. The Department has actively been developing the tools necessary for groundwater protection. In 1982 the Department published the Massachusetts Groundwater Program Summaries and in 1983 it published a Groundwater Protection Strategy. The Department continued to refine the strategy and an update of the DEQE Groundwater Protection Strategy was completed in March of 1987. The Department of Food and Agriculture, Pesticide Bureau completed a draft strategy in January 1987, entitled "The Protection of Groundwater from Pesticides."

During 1987 the Water Resources Commission dealt with water resource issues and policies related to: minimum stream flows, private wells, the registration and permitting of water withdrawals under the Water Management Act, wastewater policies and local water resources planning. In this process, it became obvious that ensuring the protection of the Commonwealth's water resources must be done through a comprehensive, coordinated and integrated approach which reaches beyond "environmental" agencies; the groundwater and surface water resources must be considered as part of a whole system, and a "water resources strategy" should be developed; and the control and development of existing and new land uses, which is in the purview of local governments, is a critical factor in water resources protection.

As DEQE began to respond to EPA's requirements for development of a statewide groundwater strategy* it became clear that the Water Resources Commission could serve as the vehicle for guiding that process. On December 14, 1987 the Water Resources Commission members voted to designate the WRC as the coordinating body for development of a state groundwater protection strategy. The current focus is on the issue of groundwater protection; at a later date the strategy can be expanded to a more comprehensive water resources protection strategy. The thrust of WRC's efforts in developing a groundwater protection strategy are to conceptualize and outline a broad policy framework within which agencies will develop specific work plans.

The WRC's overall mission is to develop, adopt and oversee the implementation of water resource policies and planning in the Commonwealth. As mentioned earlier the WRC is made up of the Commissioners, or their designees, of the agencies within the Executive Office of Environmental Affairs (EOEA): Department of Food and Agriculture (DFA), Department of Environmental Management (DEM), Metropolitan District Commission (MDC), Department of Environmental Quality Engineering (DEQE), and the Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE); the secretary of the Executive Office of Communities and Development (EOCD) and six public members appointed by the governor representing various specific interests.

The Commission works closely with two task forces. These task forces examine issues and draft policies for the Commission as well as serve a coordination function through their regular meetings and information exchange. These are the Water Supply Task Force (WSTF), made up of state agency technical representatives, and the Water Resources Planning Task Force (WRPTF) which includes federal, state, regional agencies and other interested parties.

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*States that have a groundwater protection strategy formally adopted by the Governor or board/body with appropriate policy, regulatory or legislative authority to implement the strategy will be given higher priority to receive EPA funding under groundwater management programs. These include:

- Section 106 and 205 (j) grants (Clean Water Act);
- Well Head Protection Program and Sole Source Aquifer Program (Safe Drinking Water Act Amendments of 1986); and
- Section 319 and nonpoint source funds (Water Quality Act of 1987).

The WRC's Water Supply Task Force serves as the vehicle for drafting the groundwater strategy for the WRC. Because the protection of groundwater resources must be based on a comprehensive approach, and one that goes beyond the "environmental" agencies, representation on the task force has been expanded to include the Executive Office of Communities and Development, the Department of Public Health, the Department of Public Safety, the Department of Public Works, and the Special Legislative Commission on Water Supply.

This strategy is the first of two strategy documents for groundwater. This section summarizes the current status and future direction of state groundwater protection programs and policies (Section 1). The strategy also includes an analysis of the existing programs, with recommendations to the WRC on how these programs could be improved (Section 2), a discussion of priority actions for 1989 (Section 3), and an introduction to the major policy issues which will be addressed in the second strategy document (Section 4) which will be part of this implementation plan.

To summarize the existing state groundwater protection activities and provide background for analysis the following are included in the appendices.

Appendix A - Groundwater Programs - Narrative Summaries
Appendix B - Matrix of Groundwater Related Activities
Appendix C - Matrix Background Document

2. Summary and Analysis of Existing Programs

As a result of the Task Force's discussions and of extensive personal interviews with program managers, the following findings emerged:

a. There are many interconnections among and within state agencies.

For example the DEQE Division of Water Pollution Control and Water Supply use the DEQE Office of Research and Standards to advise them on regulatory interpretations such as: what groundwater discharge is an "allowable" risk. Another example of cooperative ventures is the joining of the Metropolitan District Commission with the Department of Fisheries, Wildlife and Environmental Law Enforcement to develop a plan to implement an interagency program to most efficiently and effectively purchase watershed lands.

b. There are distinct orientations and roles played by the state agencies.

For example, the Department of Public Health is consulted and must approve regulations promulgated by DEQE. Service agencies and individuals such as the Office of Research and Standards, the state Geologist, and the DEM Division of Water Resources provide crucial technical information upon which the regulators depend. The Water Resources Commission functions as the over-arching policy making and coordinating body providing the framework and forum for others to use in implementing their own programs.

Many state agencies have a role in providing technical assistance.

The role can be "reactive"; for example, the Department of Public Health responds to requests from boards of health for information related to groundwater. The role can also be "proactive;" for example, the Department of

Public Safety is conducting training sessions on installing underground storage tanks. The Executive Office of Communities and Development holds seminars on timely topics. How or if this assistance can be better focused or effective was a question raised by the Task Force.

The reader is referred to Figure 1 and 2 at the end of this section for help in deciphering the water agencies functions and structure.

c. There is an ability to resolve conflicts.

For example, an interagency task force was established by staff of DEQE, DPH, and DFA in order to define and coordinate research and related testing on pesticides in groundwater. Another illustration is the coordination reached between DEQE and DEM on water resources planning whereby the DEM Division of Water Resources will develop minimum stream flow figures for the DEQE Division of Water Supply to use in administering the Water Management Act. DEM Division of Water Resources staff will sequence its efforts based on DEQE's scheduling of permitting water withdrawals in the 27 river basins.

d. Although priority in the past emphasized surface over groundwater concerns, the state has moved relatively rapidly to promote groundwater protection and management.

In some instances, such as in the acquisition programs, state funds were targeted for aquifer lands before becoming available for watershed preservation. In other cases, companion laws were enacted for groundwater after being in place for surface waters - for example, the state groundwater discharge permit program accompanies the National Pollution Discharge Elimination System (NPDES) program.

Recommendations

In evaluating the findings and in discussing the programs, the Task Force recommends that the Water Resources Commission take the following actions:

(1) Promote the understanding that ground and surface waters cannot be separated and that, over the long-term, a water resources strategy that includes both surface and groundwater is needed. This can be promoted specifically by:

- Encouraging the incorporation of groundwater impacts in evaluating surface discharges (such as in NPDES permits and water quality standards) and vice versa.

- Recognizing the need to focus on protecting and managing the water resource regardless of whether it is withdrawn for public or private purposes.

(2) Provide more of a scientific basis for policy decisions, specifically by:

- Coordinating research, standards, criteria and other scientifc efforts to ensure clear lines of authority and responsibility and to minimize duplication.

(3) Seek creative interconnections among state agencies, specifically by:

- Amending WRC's enabling statute or seeking an Executive Order through which the Governor could add the Executive Office of Transportation and Construction and the Department of Public Health as members, or others as necessary.

- Supporting the Water Resources Planning Task Force as a useful vehicle with broad representation.

- Encouraging participation on task forces, committees, or other mechanisms established to develop laws, regulations, guidelines and criteria.

- Fostering water resources policies and planning by setting up a mechanism (similar to Executive Order 215) which would act to limit discretionary state grants to communities pursuing actions that are inconsistent with state water policies.

(4) Improve data management and data sharing capabilities, specifically by:

- Ensuring that members purchase software which can access Geographic Information System (GIS) data.

- Focusing on basic inventories such as latitudes and longitudes of public wells and data on private water supplies.

- Sharing data and analyses within and across secretariats.

- Assuring quality of data used in the GIS.

(5) Focus on consolidating and fulfilling existing authority, recognizing that the major framework/enabling type legislation is in place, specifically by:.

- Supporting adequate state dollars and personnel to implement current authority.

- Fill in the legislative gaps within this enabling legislation such as funding the delineation of Zone II's (Zones of contribution around public wells); revising Title 5 (Environmental Code); and implementing 313 CMR 2.00 (water resources planning regulations).

(6) Focus on implementing mechanisms, specifically by:

- Encouraging post project audits or evaluations in order to inform on-going management and future policy decisions.

- Promoting environmental mitigation especially through MEPA actions.

- Ensuring that all state agencies follow environmental water resources laws.

3. Priority Actions for 1989

Each of the major actors interviewed on their on-going groundwater related activities were also asked to identify their priority projects for 1989. They are:

State Agency	Task	Implementing Body
Mass Department of Public Works	. complete the Ice and Snow Generic Environmental Impact Report	Maintenance Section
	. conduct education programs, particularly training sessions for applicators of road salt	Maintenance Section
	. extend the pilot experiments on alternatives to sodium to other geographical areas	Maintenance Section
	. conduct research on the effectiveness of various drainage solutions	Materials Section
Department of Environmental Management	. finish Chapter 800 studies (aquifer assessment) (Neponset, Hudson, Ipswich, Charles, and Taunton River Basins)	Division of Water Resources (DWR)
	. prepare for publication (draft) Volume I (Inventory and Analysis) studies of the following basins: Shawsheen, Blackstone, Concord and South Coastal	DWR
	. publish Volume I (Final) for the following basins: Charles, Taunton, Nashua, Hudson, and Neponset	DWR
	. produce 8 1/2" x 11" reduced topographic sheets of the state	DWR
	. open space acquisitions	Planning & Development
	. promote multiple use of water resources	DWR
	. examine the well driller regulations and suggest changes	DWR
	. continue to educate and inform small quantity generators	Office of Safe Waste Mgmt. (OSW)

State Agency	Task	Implementing Body
Dept. of Envir. Mgmt. (Cont.)	. distribute high school curriculum on watershed developed by the Northern Worcester coalition	OSW
	. continue source reduction efforts and hazardous waste collection days	OSW
	. serve on a "waste oil" subcommittee	OSW
Dept. of Public Safety	. revise regulations for underground tanks and containers	Board of Fire Prevention Regulations
	. training sessions to recommend practices for installing underground tanks	527 CMR 9
Dept. of Food and Agriculture	. develop storage and disposal regulations to minimize pesticide waste	Pesticides Bureau
	. establish collection of pesticide wastes from farms	Pesticides Bureau
	. complete environmental feasibility studies on certain chemicals	Pesticides Bureau using protocol established by interagency task force
	. approve a groundwater strategy for pesticides and have it adopted by the WRC	Pesticides Board
	. implement the rights-of way regulations	Pesticide Bureau
	. upgrade training for applicators	Pesticide Bureau
Dept. of Envir. Quality Engineering	. concentrate on coordinating departmental regulations among divisions	Commissioner's Office
	. direct and encourage implementation of the following: - Interim Wellhead Protection Area Policy - Work plan to protect wellheads - CCAMP recommendations	Commissioner's Office Special Projects

State Agency	Task	Implementing Body
Dept. of Envir. Quality Engr. (Cont.)	. provide leadership, encouragement and participation in inter-divisional group providing technical assistance to local governments on groundwater protection issues	Commissioner's Office Special Projects
	. manage federal grant to regional planning agencies and monitor projects to assist local governments in protecting groundwater (205 (j))	Commissioner's Office Special Projects
	. produce regulations for siting a disposal area for low level radioactive waste	Commissioner's Office Special Projects
	. work for passage of underground storage tank legislation giving both DEQE and DPS additional regulatory powers	Commissioner's Office Special Projects
	. work toward funding for state grants to municipalities to delineate Zone IIs of their public water supplies	Commissioner's Office Special Projects
	. work for a bill that will prevent the siting of activities that threaten water supplies in Zone IIs or Interim Well Head Protection Areas	Commissioner's Office Special Projects
	. strengthen the water quality assurance program	Water Quality Assurance Section DWS
	. review the delineation of Zone IIs (critical area around a well)	Technical Services, DWS
	. provide technical assistance, especially on a state well head protection program and on the Safe Drinking Water Act Amendments	Technical Services, DWS
	. implement the Water Management Act-focus on permits	DWS
	. distribute grants (aquifer lands, contamination correction, water filtration, etc.)	Grants Section DWS
	. implement Solid Waste Act especially Chapter 21h landfill assessment, clean-up and construction.	Division of Solid Waste (DSW)

State Agency	Task	Implementing Body
Dept. of Envir. Quality Engr. (Cont.)	. increase enforcement activities	DSW
	. implement interim well head protection policy	DSW
	. investigate illegal dumping	DSW
	. implement composting programs	DSW
	. solid waste planning, technical assistance	DSW
	. development of a water and soil toxics program	Office of Research and Standards (ORS)
	. program to assess human health effects of chemicals in water, definition of "significant risk"	ORS
	. integrative risk assessment	ORS
	. environmental fate modeling	ORS
	. consider revisions to Title 5 (septic tanks)	Division of Water Pollution Control
	. implement DWS Interim Well Head Protection Area Policy	DWS
	. impelement DWS Interim Well Head Protection Area Policy	Division of Hazardous Waste
Department of Fisheries, Wildlife and Environmental Law Enforcement	. several critical habitat areas that are totally dependent on groundwater have been identified. Program staff are working with towns to protect these areas	Natural Heritage Program
	. monitor research project on Buzzards Bay regarding septage leachate	Marine Fisheries
	. protect wetland areas and focus on hazardous waste dumping enforcement (MOU with DEQE)	Environmental Law Enforcement

State Agency	Task	Implementing Body
Metropolitan District Commission	. research and program development for sanitary protection and contamination risk assessment relative to MDC/MWRA waters	Division of Watershed Management (DWM)
	. groundwater data review/interpretation for hydrological, contaminant transport, and land use impact investigations	DWM
	. land acquisition and management programs	DWM Right of Way Division, Planning Div.
	. agency/community liaison activities involving MEPA, review, local boards and commissions, some public information and technical assistance	DWM Advisory Committees
Executive Office of Environmental Affairs	. Radon studies	State Geologist
	. publish surficial geology maps	State Geologist
	. provide input on low-level radioactive waste disposal	State Geologist
	. develop groundwater protection strategy	Water Resources Commission
	. examine the impacts of the amended Federal Safe Drinking Water Act	WRC
	. develop natural resource conservation plan	State Committee for the conservation of Soil, Water and Related Resources (MSCCSWRR)
Special Legislative Commission on Water Supply	. release private water supply study	Special Legislative Commission on Water Supply (SLCWS)

State Agency	Task	Implementing Body
Special Leg. Comm. on Wtr. Supply (Cont.)	. lobby for SLCWS bills (such as underground petroleum tank storage, pesticides management, road salt, source reduction, household haz. waste)	SLCWS
	. education	SLCWS
	. support budget needs	SLCWS
Executive Office of Communities and Development	. provide grants to inventory resources, promote land use regulations, do planning	Municipal Division
	. training, such as educational seminars	Office of Local & Regional Plng.

4. Long-term Groundwater Strategy

The next step, after the Water Resources Commission reviews and finalizes this strategy, is to develop a second policy-oriented strategy. The second document will present an approach, an orientation, a sense of direction as a framework to guide allocation of state resources and time. The Water Supply Task Force will continue to serve as the vehicle for drafting the strategy for consideration by the Water Resources Commission.

Policy issues identified for exploration include: the relative emphasis of managing risks vs. resources; drinking water vs. other groundwater uses; public vs. private water supplies; state vs. local roles and capabilities; and prevention vs. clean-up.

Projected completion date is the fall of 1989.

II. Management Plan Approach

A. Setting Priorities

As with any management plan there must be a framework or system for setting priorities. The EPA has published a report with recommendations for nonpoint source control (EPA, 1987). The following discussion on program implementation and prioritization has been adapted from that publication.

1. A careful analysis of institutional resources and capabilities should ensure that the plan can be implemented successfully.

The Division of Water Pollution Control (DWPC) within the Department of Environmental Quality Engineering (DEQE) has been designated by the Commissioner as the lead nonpoint source control agency. Within the DWPC there has been established a nonpoint source program which is part of the Technical Services Branch (TSB). Staff personnel within the TSB have expertise in chemical, biological and physical aspects of water quality as well as administrative and program management capabilities.

While the DWPC is the lead agency for this program, its success depends on the ability to coordinate the program implementation with other appropriate agencies on the federal, state, regional and local level. Subsequent sections of this plan will describe this agency coordination process in greater detail. Strong support from the Executive Office of Environmental Affairs (EOEA) leadership will help ensure success of the Management Plan.

2. Priority areas must be chosen in order to focus implementation efforts.

The management plan approach is to divide the program elements into short term and long term strategies. The short term approach aims to achieve results through prioritized demonstration projects and to support and coordinate ongoing state-wide nonpoint source programs. This will generally include the application of best management practices to the problems identified in the assessment report. The process will involve both regulatory and nonregulatory programs. The long term approach is to examine the more frequent, pervasive and widespread nonpoint source problems and decide on how best to manage them. Relevant tasks would include possible regulatory revision (e.g., Title 5, subsurface disposal of sewage) and legislative initiatives (e.g., stormwater runoff).

This management plan includes in the short term strategies section, a short description of the nature of the various nonpoint sources of pollution. These short descriptions are not intended to be all-inclusive but rather to give the reader a general reminder of the types of pollutants and range of activities involved. The descriptive material comes from a booklet by the U.S. EPA entitled, "Ready Reference Guide to Nonpoint Source Pollution - Sources, Pollutants, Impairments, Best Management Practices For the New England States, 1988." Another reference available to the reader is "Nonpoint Source Pollution - An Outline of Basic Information" available from the Technical Services Branch of the Division of Water Pollution Control, Lyman School, Westborough, 01581 (508/366-9181).

3. An implementation strategy which considers task-specific or site-specific factors will be designed for each identified priority area.

For the short term issues this will include identifying the appropriate agency and program (regulatory or nonregulatory) for implementation of the nonpoint source control strategies. This will boil down to two approaches: first, what nonpoint issues or identified problems can be addressed under existing programs or regulations, and second, what issues or nonpoint problems should be addressed under demonstration projects utilizing best management practices.

For both cases the project coordination will be provided by the TSB/DWPC. When other agencies and programs are involved the TSB will identify project officers or coordinators to work with.

Thus, "once institutional capabilities have been determined, a select number of areas should be targeted and site-specific nonpoint source implementation strategies developed" (EPA, 1987). There is a need for some flexibility to be accommodated in the overall nonpoint source program. The TSB recognizes the sometimes confusing and sometimes interwoven authorities of various state agencies as they relate to water quality and water resources. The bottom line is cooperation to address the water quality problems caused by nonpoint sources. This plan does not propose to duplicate or recreate existing mandates or programs in the area of nonpoint source control. Rather, the plan will identify those areas where additional assistance is warranted in order to implement the plan or aspects thereof. Figure 1 and 2 are presented to give a functional perspective of Massachusetts water agencies.

B. Establishment and Use of Nonpoint Source Advisory Committee.

A Nonpoint Source Advisory Committee (the committee) was created and held its first meeting on May 13, 1987. The purpose of the committee is to assist the DWPC in developing the nonpoint assessment report and management plan. Members of the committee represent federal, state, regional and local organizations which have an interest in nonpoint source pollution. A list of the current committee members is attached as Appendix D. The Committee shows a balanced representation of water quality interests on a state-wide basis.

The Committee has proven to be very supportive and interested in the prospect of a state-wide nonpoint source program and has had an integral part in shaping not only the plan but the assessment report as well. In this regard, the Committee has served to fulfill the requirement of Section 319(b) (3) of the Clean Water Act, the utilization of local, and private experts.

The shape and direction of this management plan was formulated by the advisory committee. The Committee will continue to function over the four year implementation schedule of the plan. The plan's progress will be reviewed annually by the Committee and any necessary adjustments or fine-tuning that are deemed appropriate will be considered. As members of the Committee, Region I EPA NPS staff will be informed and kept up-to-date on all actions of the Committee.

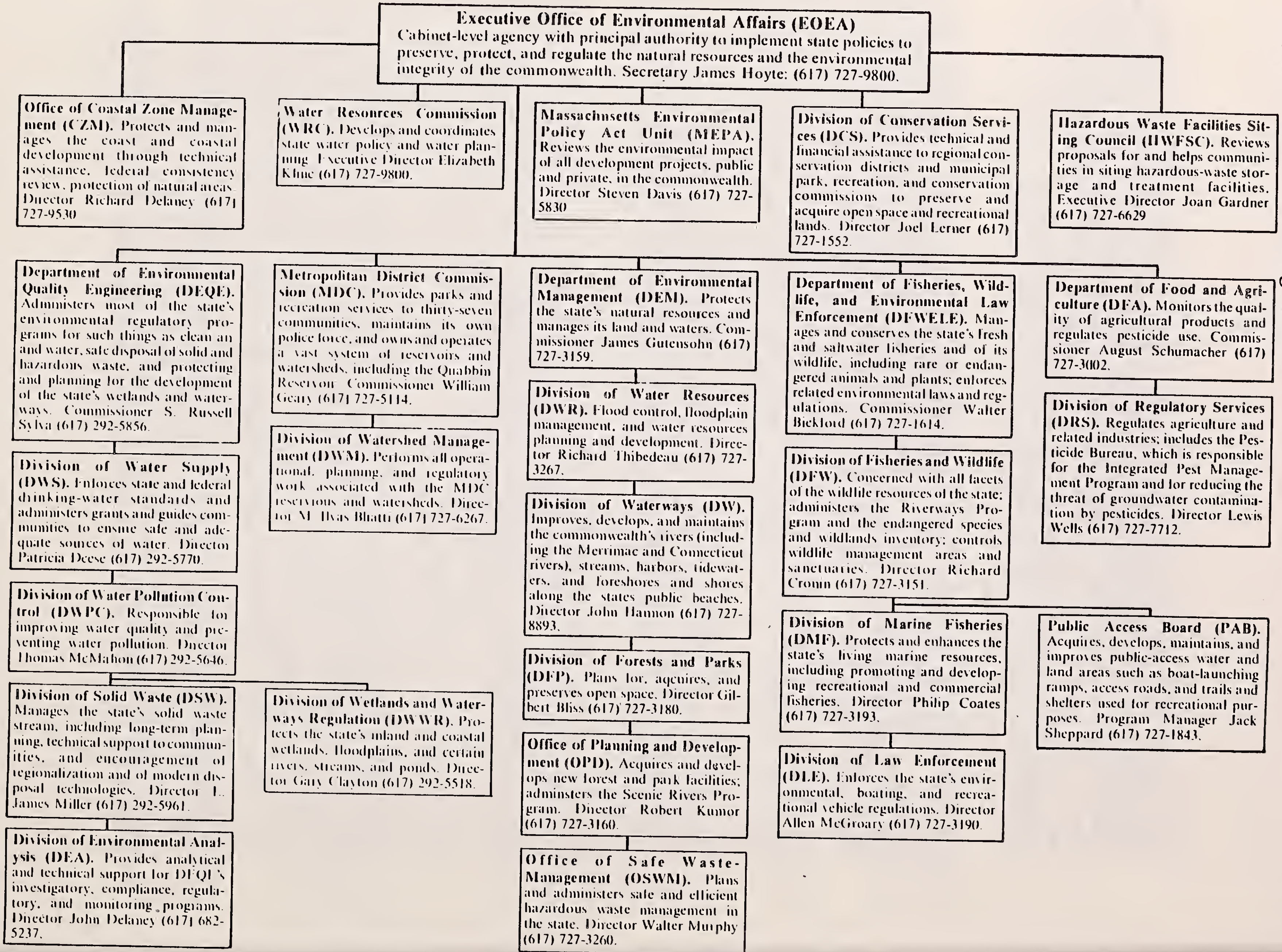
C. Results of Assessment Report

The following is an analysis of nonpoint pollution problems by basin and by source. This information was taken from the Commonwealth of Massachusetts Summary of Water Quality 1988 - Appendix IV Nonpoint Source Assessment Report, and for Cape Cod from a report entitled, Estimated Acreage of Closed Shellfish Waters as a Result of Point and Nonpoint Source Pollution. Sources for each basin were broken down according to the categories and subcategories given in the E.P.A. Guidelines for the Preparation of the 1988 State Water Quality Assessment Report (305 (b)) (see Table 1). They were also broken down by waterbody affected, rivers (includes estuaries), lakes, or salt water (bays, coves, and harbors). In addition to listing miles or square mile affected, percentages of the waterbodies affected by each category were calculated as well as the percentage of the waterbodies affected by nonpoint sources in general (see Table 2). It should be noted that the total miles or areas of the combined categories may exceed the total miles or areas affected/assessed due to the fact that some areas are affected by more than one category of nonpoint pollution source.

Analysis of the data shows the greatest impact to be from surface runoff followed by natural conditions, in-place sediments, septic systems, combined sewers and others. Although they are mentioned in this discussion, combined sewers are considered a point source in Massachusetts. Due to time constraints we were unable to confirm the categories into which these problems were placed. It is felt that the surface runoff category will be smaller in the final analysis. It appears that during the first cut this category was not interpreted as strictly urban surface runoff. As such, agriculture, silviculture, construction runoff, as well as, storm and combined sewer discharges were included in this category. Many of these were corrected during the first analysis, however, those areas not familiar to the staff may still contain errors which will be corrected during the update. Another area known to be inaccurate are the salt water and tributary areas which are listed as having known nonpoint problems but have no area affected. These areas were not included at this time but will be calculated and entered during the update. Some other areas were not included which the staff felt were likely to be problem areas. These will be addressed and dealt with appropriately. Information obtained from other sources (conservation commissions, conservation districts, surveys, etc.) will also be included in the update.

Graphic information presented at this time includes Figures 3-13, the percent affected by major NPS categories for rivers, lakes and salt water respectively.

Figure 1: State Water Agencies



- **Executive Office of Environmental Affairs (EOEA)** Cabinet-level agency with principal authority to implement state policies to preserve, protect, and regulate the natural resources and the environmental integrity of the commonwealth. Secretary James Hoyte: (617) 727-9800.
  - **Office of Coastal Zone Management (CZM).** Protects and manages the coast and coastal development through technical assistance, federal consistency review, protection of natural areas. Director Richard Delaney (617) 727-9530
  - **Water Resources Commission (WRC).** Develops and coordinates state water policy and water planning. Executive Director Elizabeth Kline (617) 727-9800.
  - **Massachusetts Environmental Policy Act Unit (MEPA).** Reviews the environmental impact of all development projects, public and private, in the commonwealth. Director Steven Davis (617) 727-5830
  - **Division of Conservation Services (DCS).** Provides technical and financial assistance to regional conservation districts and municipal park, recreation, and conservation commissions to preserve and acquire open space and recreational lands. Director Joel Lerner (617) 727-1552.
  - **Hazardous Waste Facilities Siting Council (HWFSC).** Reviews proposals for and helps communities in siting hazardous-waste storage and treatment facilities. Executive Director Joan Gardner (617) 727-6629
  - **Department of Environmental Quality Engineering (DEQE).** Administers most of the state's environmental regulatory programs for such things as clean air and water, safe disposal of solid and hazardous waste, and protecting and planning for the development of the state's wetlands and waterways. Commissioner S. Russell Sylva (617) 292-5856.
    - **Division of Water Supply (DWS).** Enforces state and federal drinking-water standards and administers grants and guides communities to ensure safe and adequate sources of water. Director Patricia Deese (617) 292-5770.
      - **Division of Water Pollution Control (DWPC).** Responsible for improving water quality and preventing water pollution. Director Thomas McMahon (617) 292-5646.
        - **Division of Solid Waste (DSW).** Manages the state's solid waste stream, including long-term planning, technical support to communities, and encouragement of regionalization and of modern disposal technologies. Director L. James Miller (617) 292-5961.
          - **Division of Environmental Analysis (DEA).** Provides analytical and technical support for DEQE's investigatory, compliance, regulatory, and monitoring programs. Director John Delaney (617) 682-5237.
        - **Division of Wetlands and Waterways Regulation (DWWR).** Protects the state's inland and coastal wetlands, floodplains, and certain rivers, streams, and ponds. Director Gary Clayton (617) 292-5518.
  - **Metropolitan District Commission (MDC).** Provides parks and recreation services to thirty-seven communities, maintains its own police force, and owns and operates a vast system of reservoirs and watersheds, including the Quabbin Reservoir. Commissioner William Geary (617) 727-5114.
    - **Division of Watershed Management (DWM).** Performs all operational, planning, and regulatory work associated with the MDC reservoirs and watersheds. Director M. Ilyas Bhatti (617) 727-6267.
  - **Department of Environmental Management (DEM).** Protects the state's natural resources and manages its land and waters. Commissioner James Gutensohn (617) 727-3159.
    - **Division of Water Resources (DWR).** Flood control, floodplain management, and water resources planning and development. Director Richard Thibedeau (617) 727-3267.
      - **Division of Waterways (DW).** Improves, develops, and maintains the commonwealth's rivers (including the Merrimac and Connecticut rivers), streams, harbors, tidewaters, and foreshores and shores along the states public beaches. Director John Hannon (617) 727-8893.
        - **Division of Forests and Parks (DFP).** Plans for, aqcuires, and preserves open space. Director Gilbert Bliss (617) 727-3180.
          - **Office of Planning and Development (OPD).** Acquires and develops new forest and park facilities; adminsters the Scenic Rivers Program. Director Robert Kumor (617) 727-3160.
            - **Office of Safe Waste-Management (OSWM).** Plans and administers safe and efficient hazardous waste management in the state. Director Walter Murphy (617) 727-3260.
  - **Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE).** Manages and conserves the state's fresh and saltwater fisheries and of its wildlife, including rare or endangered animals and plants; enforces related environmental laws and regulations. Commissioner Walter Bickford (617) 727-1614.
    - **Division of Fisheries and Wildlife (DFW).** Concerned with all facets of the wildlife resources of the state; administers the Riverways Program and the endangered species and wildlands inventory; controls wildlife management areas and sanctuaries. Director Richard Cronin (617) 727-3151.
      - **Division of Marine Fisheries (DMF).** Protects and enhances the state's living marine resources, including promoting and developing recreational and commercial fisheries. Director Philip Coates (617) 727-3193.
        - **Division of Law Enforcement (DLE).** Enforces the state's environmental, boating, and recreational vehicle regulations. Director Allen McGroary (617) 727-3190.
      - **Public Access Board (PAB).** Acquires, develops, maintains, and improves public-access water and land areas such as boat-launching ramps, access roads, and trails and shelters used for recreational purposes. Program Manager Jack Sheppard (617) 727-1843.
  - **Department of Food and Agriculture (DFA).** Monitors the quality of agricultural products and regulates pesticide use. Commissioner August Schumacher (617) 727-3002.
    - **Division of Regulatory Services (DRS).** Regulates agriculture and related industries; includes the Pesticide Bureau, which is responsible for the Integrated Pest Management Program and for reducing the threat of groundwater contamination by pesticides. Director Lewis Wells (617) 727-7712.

Figure 2: State Water Agencies by Function

	DEQE DWS	DEQE DWPC	DEQE DSW & DHW	DEQE DWWR	DEM DWR	DEM OSWM	DEM DFP	DEM DW	DEM OPD	DFWELE	DFA DRS	CZM	CS	MDC	WRC
Resource Information & Data															
Population projections					□										
Water demand projections	□				■										
Hydrologic data	□				■							□		□	
Water quality data	■	□										□		□	
Groundwater data	□				■										
Water use data	■				□									□	
Water supply data	■				■									□	
Wetlands mapping				■											
Floodplain mapping					■										
Fisheries data		□								■		□			
Water Resource Planning															
River basin planning					■										
Policy development															■
Local water resource planning	□				□					□					■
Water supply planning	□				■										
Coastal zone planning					□							■			
Flood hazard planning															
Greenways and riverways planning									□	■					
Emergency response planning	■				□										
Open space planning							□		■	□			□	□	
Water Resource Protection															
Maintain water quality standards		■								□					
Watershed protection	■				□					■				□	
Riverways protection									□	■					
Wetlands protection and licensing				■											
Aquifer protection	■														
Title V—Septic managment		□												□	
Clean lakes program		■													
Contamination correction and fish-kills	■									□					
Land conservation and acquisition							□		□	□			□	□	
Scenic Rivers Program									■						
Management															
Permitting of surface and groundwater discharge		■										□		□	
Pretreatment of industrial sources		□													
Permitting of water withdrawals	■														
New water supply source approvals	■				□										
Well-head protection	■														
Water conservation	■														
Solid and hazardous waste management	□	□	■			□									
Non-point-source pollution control														□	
Pesticide managment		□									□				
Dam safety and harbor and stream improvements								■							
Well-drillers' registration															
Interbasin transfer review	□	□								□					■
Education															
Public information	□	□	□	□	□	□			□	□		□		□	
Education	□	□	□	□	□	□			□	□		□		□	

■ primary role □ secondary role

TABLE 1

Major Nonpoint Source (NPS) Pollution Categories and Subcategories*

NONPOINT SOURCES

10 Agriculture
11: Non-irrigated crop production
12: Irrigated crop production
13: Specialty crop production (e.g., truck farming and orchards)
14: Pasture land
15: Range land
16: Feedlots - all types
17: Aquaculture
18: Animal holding/management areas

20 Silviculture
21: Harvesting, reforestation, residue management
22: Forest management
23: Road construction/maintenance

30 Construction
31: Highway/road/bridge
32: Land development

40 Urban Runoff
41: Storm sewers (source control)
** 42: Combined sewers (source control)
43: Surface runoff

50 Resource Extraction/Exploration/Development
51: Surface mining
52: Subsurface mining
53: Placer mining
54: Dredge mining
55: Petroleum activities
56: Mill tailings
57: Mine tailings

60 Land Disposal (Runoff/Leachate From Permitted Areas)
61: Sludge
62: Wastewater
63: Landfills
64: Industrial land treatment
65: On-site wastewater systems (septic tanks, etc.)
66: Hazardous waste

70 Hydrologic/Habitat Modification
71: Channelization
72: Dredging
73: Dam construction
74: Flow regulation/modification
75: Bridge construction
76: Removal of riparian vegetation
77: Streambank modification/destabilization

80 Other
81: Atmospheric deposition
82: Waste storage/storage tank leaks
83: Highway maintenance and runoff
84: Spills
85: In-place contaminants
86: Natural
87: Marinas
88: Boat discharge

90 Source unknown

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*Source: US EPA. Guidelines for the Preparation of the 1988 State Water Quality Assessment (305(b) Report), April 1, 1987, p. 19.

**Considered a point source in Massachusetts.

TABLE 2

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES^2	%	MILES^2	%
Assabet	14 Pasture	2.3	7.4	--	--	--	--
	41 Storm Sewers	19.8	63.9	--	--	--	--
	43 Surface Runoff	31.0	100	--	--	--	--
	51 Gravel Pit	2.3	7.4	--	--	--	--
	65 Septic Systems	6.5	21.0	--	--	--	--
	85 Sediments	21.7	70.0	--	--	--	--
Total Affected by Nonpoint Sources		31.0	100	--	--	--	--
	Total Assessed	31.0		--		--	
Blackstone	41 Storm Sewers	13.5	15.9	--	--	--	--
	42 Combined Sewers	6.0	7.1	--	--	--	--
	43 Surface Runoff	25.5	30.0	2.8	100	--	--
	63 Landfill	--	--	0.2	7.1	--	--
	65 Septic Systems	8.0	9.4	1.6	57.1	--	--
	85 Sediments	20.2	23.8	--	--	--	--
Total Affected by Nonpoint Sources		54.2	63.8	2.8	100	--	--
	Total Assessed	84.9		2.8		--	
Boston Harbor	41 Storm Sewers	--	--	--	--	3.1	6.6
	85 Sediments	--	--	--	--	2.3	4.9
	88 Boat Discharge	--	--	--	--	2.3	4.9
Total Affected by Nonpoint Sources		--	--	--	--	5.4	11.4
	Total Assessed	--		--		47.3	
Buzzards Bay	14 Pasture	--	--	--	--	1.6	5.4
	41 Storm Sewers	--	--	--	--	10.4	34.9
	43 Surface Runoff	45.8	72.2	0.2	100	7.3	24.5
	63 Landfill	1.0	1.6	--	--	--	--
	65 Septic Systems	39.7	62.6	--	--	2.5	8.4
	66 Haz. Waste Site	2.0	3.2	--	--	--	--
	85 Sediments	9.6	15.1	--	--	6.7	22.5
	86 Natural	2.0	3.2	--	--	0.6	2.0
	88 Boat Discharge	0.7	1.1	--	--	4.4	14.8
Total Affected by Nonpoint Sources		45.8	72.2	0.2	100	26.7	89.6
	Total Assessed	63.4		0.2		29.8	

TABLE 2 (CONTINUED)

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES^2	%	MILES^2	%
Cape Cod	43 Surface Runoff	--	--	2.4	63.2	29.4	88.6
	65 Septic Systems	--	--	3.5	92.1	4.1	12.3
	86 Natural	--	--	--	--	0.1	0.3
	87 Marinas	--	--	--	--	26.4	79.5
	88 Boat Discharge	--	--	--	--	--	--
Total Affected by Nonpoint Sources		--	--	3.8	100	33.2	100
	Total Assessed	--		3.8		33.2	
Charles	41 Storm Sewers	33.6	36.6	--	--	--	--
	42 Combined Sewers	4.2	4.6	--	--	--	--
	43 Surface Runoff	33.6	36.6	0.5	100	--	--
	65 Septic Systems	--	--	0.2	40	--	--
	85 Sediments	11.3	12.3	--	--	--	--
	86 Natural	41.4	45.0	--	--	--	--
Total Affected by Nonpoint Sources		84.8	92.3	0.5	100	--	--
	Total Assessed	91.9		0.5		--	
Chicopee	41 Storm Sewers	3.0	2.2	--	--	--	--
	43 Surface Runoff	50.7	37.3	1.7	81.0	--	--
	65 Septic Systems	11.8	8.7	1.2	57.1	--	--
	86 Natural	19.9	14.6	--	--	--	--
Total Affected by Nonpoint Sources		82.0	60.3	2.1	100	--	--
	Total Assessed	135.9		2.1		--	
Connecticut	11 Crop Production	34.2	42.8	--	--	--	--
	42 Combined Sewers	15.9	19.9	--	--	--	--
	43 Surface Runoff	35.6	44.6	0.7	87.5	--	--
	65 Septic Systems	--	--	0.1	12.5	--	--
	85 Sediments	34.2	42.8	--	--	--	--
	90 Unknown	--	--	0.01	1.3	--	--
Total Affected by Nonpoint Sources		51.5	64.5	0.8	100	--	--
	Total Assessed	79.9		0.8		--	

TABLE 2 (CONTINUED)

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES^2	%	MILES^2	%
Deerfield	65 Septic Systems	--	--	0.1	100	--	--
Total Affected by Nonpoint Sources		0.0	0.0	0.1	100	--	--
	Total Assessed	79.2		0.1	100	--	
Farmington	43 Surface Runoff	14.5	56.6	--	--	--	--
Total Affected by Nonpoint Sources		14.5	56.6	--	--	--	--
	Total Assessed	25.6		--		--	
French	14 Pasture	2.5	7.0	--	--	--	--
	43 Surface Runoff	1.5	4.2	1.8	100	--	--
	65 Septic Systems	2.5	7.0	1.8	100	--	--
	85 Sediments	2.3	6.5	--	--	--	--
Total Affected by Nonpoint Sources		8.8	24.8	1.8	100	--	
	Total Assessed	35.5		1.8			
Hoosic	43 Surface Runoff	27.6	72.8	0.7	100	--	--
	86 Natural	3.8	10.0	--	--	--	--
Total Affected by Nonpoint Sources		31.4	82.8	0.7	100	--	--
	Total Assessed	37.9		0.7		--	
Housatonic	43 Surface Runoff	69.0	86.8	3.0	100	--	--
	63 Landfill	10.3	13.0	--	--	--	--
	65 Septic Systems	1.9	2.4	2.0	66.7	--	--
	85 Sediments	55.4	69.7	--	--	--	--
	90 Unknown	4.7	5.9	--	--	--	--
Total Affected by Nonpoint Sources		75.6	95.1	3.0	100	--	--
	Total Assessed	79.5		3.0		--	

TABLE 2 (CONTINUED)

BASIN	CATEGORY	RIVERS MILES	RIVERS %	LAKES MILES^2	LAKES %	COASTAL MILES^2	COASTAL %
Ipswich	43 Surface Runoff	--	--	0.1	50	--	--
	65 Septic System	--	--	0.2	100	--	--
	86 Natural	32.1	87.7	--	--	--	--
	90 Unknown	4.5	12.3	--	--	--	--
Total Affected by Nonpoint Sources		36.6	100	0.2	100	--	--
	Total Assessed	36.6		0.2		--	
Islands	43 Surface Runoff	--	--	1.2	44.4	0.8	3.4
	65 Septic Systems	--	--	2.7	100	4.5	19.2
	86 Natural	--	--	1.4	51.9	1.3	5.6
	88 Boat Discharges	--	--	--	--	12.4	53.0
Total Affected by Nonpoint Sources		--	--	2.7	100	17.2	73.5
	Total Assessed	--		2.7		23.4	
Merrimack	10 Agriculture	--	--	0.9	40.9	--	--
	32 Land Development	--	--	0.9	40.9	--	--
	42 Combined Sewers	25.5	35.0	--	--	--	--
	43 Surface Runoff	6.4	8.8	1.8	81.8	--	--
	65 Septic Systems	--	--	1.9	86.4	--	--
Total Affected by Nonpoint Sources		31.9	43.8	2.2	100	--	--
	Total Assessed	72.8		2.2		--	
Millers	43 Surface Runoff	--	--	0.2	100	--	--
	65 Septic Systems	--	--	0.1	50	--	--
	85 Sediments	4.8	9.4	--	--	--	--
	86 Natural	2.6	5.1	--	--	--	--
Total Affected by Nonpoint Sources		7.4	14.5	0.2	100	--	--
	Total Assessed	51.0		0.2		--	

TABLE 2 (CONTINUED)

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES^2	%	MILES^2	%
Mount Hope Bay*	43 Surface Runoff	3.6	50.0	--	--	--	--
	65 Septic Systems	4.9	68.1	--	--	--	--
	85 Sediments	2.8	38.9	--	--	--	--
Total Affected by Nonpoint Sources		7.2	100	--	--	--	--
	Total Assessed	7.2		--		--	
Mystic	43 Surface Runoff	16.4	89.1	0.7	100	--	--
	64 Ind. Land Trmt.	16.4	89.1	--	--	--	--
	65 Septic Systems	--	--	0.2	28.6	--	--
Total Affected by Nonpoint Sources		16.4	89.1	0.7	100	--	--
	Total Assessed	18.4		0.7		--	
Nashua	43 Surface Runoff	63.5	62.3	1.7	85	--	--
	63 Landfill	2.7	2.6	--	--	--	--
	65 Septic Systems	7.4	7.3	1.2	60	--	--
	86 Natural	4.6	4.5	--	--	--	--
Total Affected by Nonpoint Sources		70.7	69.4	2.0	100	--	
	Total Assessed	101.9		2.0			
Neponset	43 Surface Runoff	33.3	100	1.0	100	--	--
	85 Sediment	--	--	0.4	40.0	--	--
Total Affected by Nonpoint Sources		33.3	100	1.0	100	--	--
	Total Assessed	33.3		1.0		--	
North Shore	41 Storm Sewers	--	--	--	--	0.6	2.2
	43 Surface Runoff	14.6	34.0	1.0	100	26.7	97.4
	63 Landfill	5.6	13.0	--	--	--	--
	65 Septic Systems	4.9	11.4	0.3	30	--	--
	85 Sediments	17.2	40.0	--	--	4.6	16.8
	90 Unknown	25.6	59.5	--	--	0.02	0.07

*These are tidal rivers.

TABLE 2 (CONTINUED)

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES[2]	%	MILES[2]	%
North Shore (cont.)							
	88 Boat Discharges	8.5	19.8	--	--	5.9	21.5
Total Affected by Nonpoint Sources		43.0	100	1.0	100	27.4	100
	Total Assessed	43.0		1.0		27.4	
Parker	86 Natural	22.0	100	--	--	--	--
Total Affected by Nonpoint Sources		22.0	100	--	--	--	--
	Total Assessed	22.0		--		--	
Quinebaug	41 Storm Sewers	2.0	5.1	--	--	--	--
	43 Surface Runoff	1.2	3.1	1.4	100	--	--
	65 Septic Systems	6.9	17.6	1.3	92.9	--	--
	85 Sediments	2.0	5.1	--	--	--	--
Total Affected by Nonpoint Sources		10.1	25.7	1.4	100	--	--
	Total Assessed	39.3		1.4		--	
Shawsheen	43 Surface Runoff	25.0	100	0.02	50	--	--
	65 Septic Systems	--	--	0.04	100	--	--
	86 Natural	17.4	69.6	--	--	--	--
Total Affected by Nonpoint Sources		25.0	100	0.04	100	--	--
	Total Assessed	25.0		0.04		--	
South Shore	41 Storm Sewers	--	--	--	--	2.6	12.3
	43 Surface Runoff	19.6	37.9	0.9	100	14.3	67.8
	65 Septic Systems	29.7	57.4	0.5	55.6	13.5	64.0
	86 Natural	24.7	47.8	--	--	0.8	3.8
	90 Unknown	--	--	--	--	0.3	1.4
	88 Boat Discharge	4.2	8.1	--	--	--	--
Total Affected by Nonpoint Sources		38.7	74.9	0.9	100	17.2	81.5
	Total Assessed	51.7		0.9		21.1	

TABLE 2 (CONTINUED)

		RIVERS		LAKES		COASTAL	
BASIN	CATEGORY	MILES	%	MILES^2	%	MILES^2	%
Stony Brook	43 Surface Runoff	15.6	89.1	--	--	--	--
	65 Septic Systems	3.3	18.9	--	--	--	--
	73 Dam/Impoundment	7.2	41.1	--	--	--	--
	86 Natural	14.2	81.1	--	--	--	--
Total Affected by Nonpoint Sources		17.5	100	--	--	--	--
	Total Assessed	17.5		--		--	
Sudbury/Concord	43 Surface Runoff	22.0	34.4	2.1	84.0	--	--
	65 Septic Systems	22.3	34.9	1.0	40.0	--	--
	85 Sediments	7.0	11.0	--	--	--	--
	86 Natural	25.5	39.9	0.3	12.0	--	--
Total Affected by Nonpoint Sources		53.6	83.9	2.5	100	--	--
	Total Assessed	63.9		2.5		--	
Taunton	43 Surface Runoff	73.9	42.8	2.3	92.0	--	--
	63 Landfill	--	--	0.2	8.0	--	--
	65 Septic Systems	19.3	11.2	1.4	56.0	--	--
	86 Natural	47.7	27.6	--	--	--	--
	90 Unknown	8.0	4.6	--	--	--	--
Total Affected by Nonpoint Sources		116.1	67.2	2.5	100	--	--
	Total Assessed	172.7		2.5		--	
Ten Mile	43 Surface Runoff	23.7	75.0	--	--	--	--
	85 Sediments	12.2	38.6	--	--	--	--
	86 Natural	4.0	12.7	--	--	--	--
Total Affected by Nonpoint Sources		27.7	87.7	--	--	--	--
	Total Assessed	31.6		--		--	

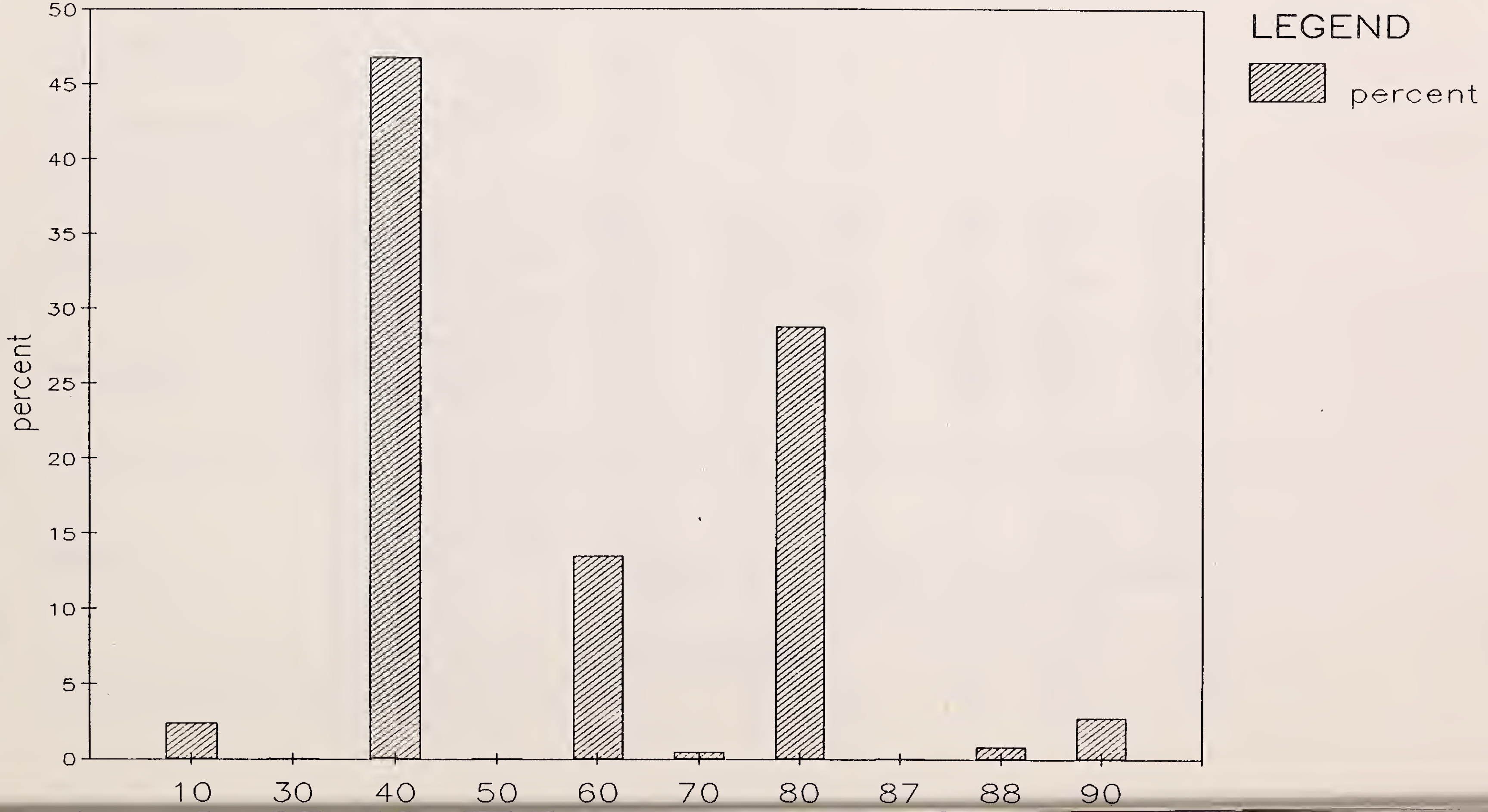
TABLE 2 (CONTINUED)

BASIN	CATEGORY	RIVERS MILES	RIVERS %	LAKES MILES^2	LAKES %	COASTAL MILES^2	COASTAL %
Westfield	43 Surface Runoff	4.7	4.4	0.9	100	--	--
	65 Septic Systems	9.2	8.7	0.9	100	--	--
Total Affected By Nonpoint Sources		9.2	8.7	0.9	100	--	--
	Total Assessed	106.0		0.9		--	
Weymouth & Weir	43 Surface Runoff	19.6	83.8	0.4	100	--	--
	65 Septic Systems	15.6	66.7	--	--	--	--
	66 Haz.Waste Site	0.8	3.4	--	--	--	--
Total Affected by Nonpoint Sources		19.6	83.8	0.4	100	--	--
	Total Assessed	23.4		0.4		--	
State Totals	10 Agriculture	--	--	0.9	2.6	--	--
	11 Crop Production	34.2	2.2	--	--	--	--
	14 Pasture	4.8	0.3	--	--	1.6	0.9
	32 Land Development	--	--	0.9	2.6	--	--
	41 Storm Sewers	71.9	4.6	1.7	4.9	16.7	9.2
	42 Combined Sewers	51.6	3.3	--	--	--	--
	43 Surface Runoff	677.9	43.7	27.8	80.8	78.5	43.1
	51 Gravel Pits	2.3	0.1	--	--	--	--
	63 Landfills	19.6	1.3	0.2	0.6	--	--
	64 Indust. Land Tmt.	16.4	1.1	--	--	--	--
	65 Septic Systems	193.9	12.5	24.5	71.2	24.6	13.5
	66 Haz. Waste Site	2.8	0.2	--	--	--	--
	73 Dam/Impoundment	7.2	0.5	--	--	--	--
	85 Sediments	200.7	12.9	0.4	1.2	13.6	7.5
	86 Natural	261.9	16.9	1.7	4.9	2.8	1.5
	90 Unknown	42.8	2.8	0.01	0.03	0.3	0.2
	88 Boat Discharge	13.4	0.9	--	--	25.0	13.7
	87 Marinas	--	--	--	--	24.6	13.5
Total Affected by Nonpoint Sources		1,065.6	68.7	34.4	100	127.1	69.8
	Total Assessed	1,550.1		34.4		182.2	

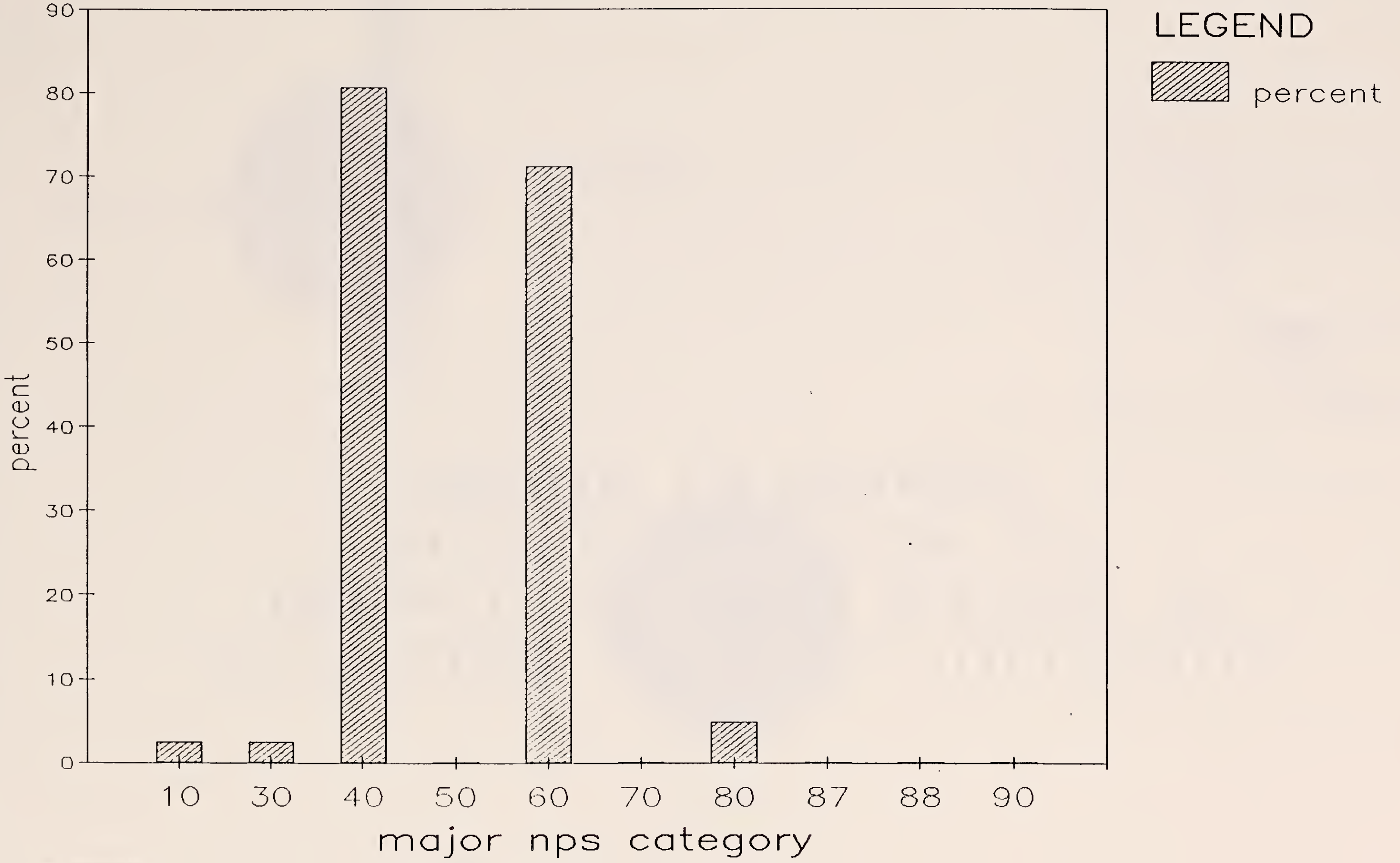
TABLE 2 (CONTINUED)

BASIN	CATEGORY	RIVERS MILES	RIVERS %	LAKES MILES^2	LAKES %	COASTAL MILES^2	COASTAL %
State Totals	10 Agriculture	39.0	2.5	0.9	2.6	1.6	0.9
	30 Construction	--	--	0.9	2.6	--	--
	40 Urban Runoff	725.0	46.8	27.8	80.8	88.3	48.5
	50 Resource Extract.	2.3	0.1	--	--	--	--
	60 Land Disposal	211.1	13.6	24.5	71.2	24.6	13.5
	70 Hydrologic Modif.	7.2	0.5	--	--	--	--
	80 Other	446.7	28.8	1.7	4.9	14.2	7.8
	90 Unknown	42.8	2.8	0.01	0.03	0.3	0.2

NONPOINT SOURCE POLLUTION IMPACT ON RIVERS IN MASSACHUSETTS BY MAJOR CATEGORY



NONPOINT SOURCE POLLUTION IMPACT ON LAKES IN MASSACHUSETTS BY MAJOR CATEGORY



NONPOINT SOURCE POLLUTION IMPACT ON SALT WATER IN MASSACHUSETTS BY MAJOR CATEGORY

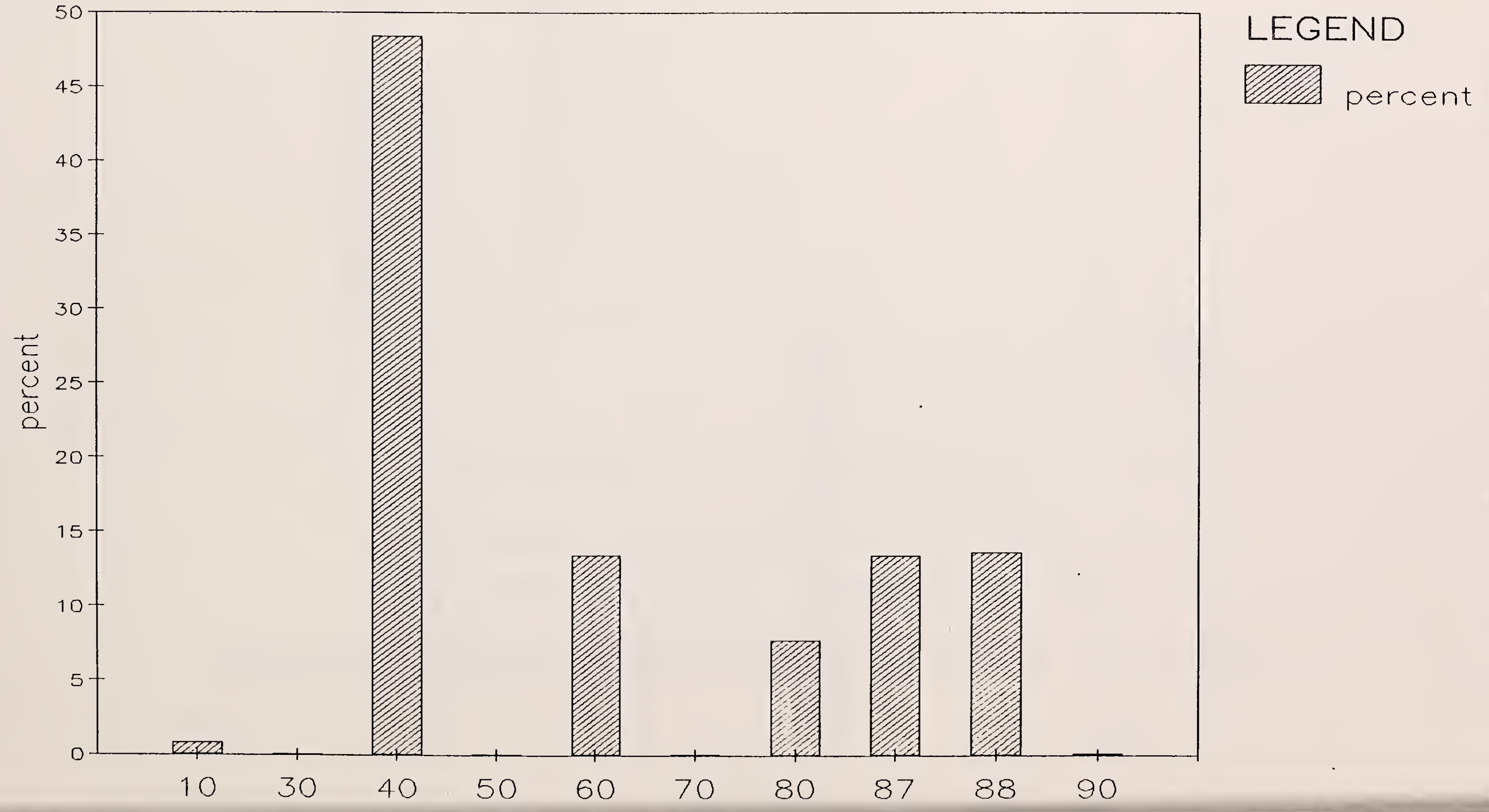


FIGURE 6

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR AGRICULTURE IN MASSACHUSETTS

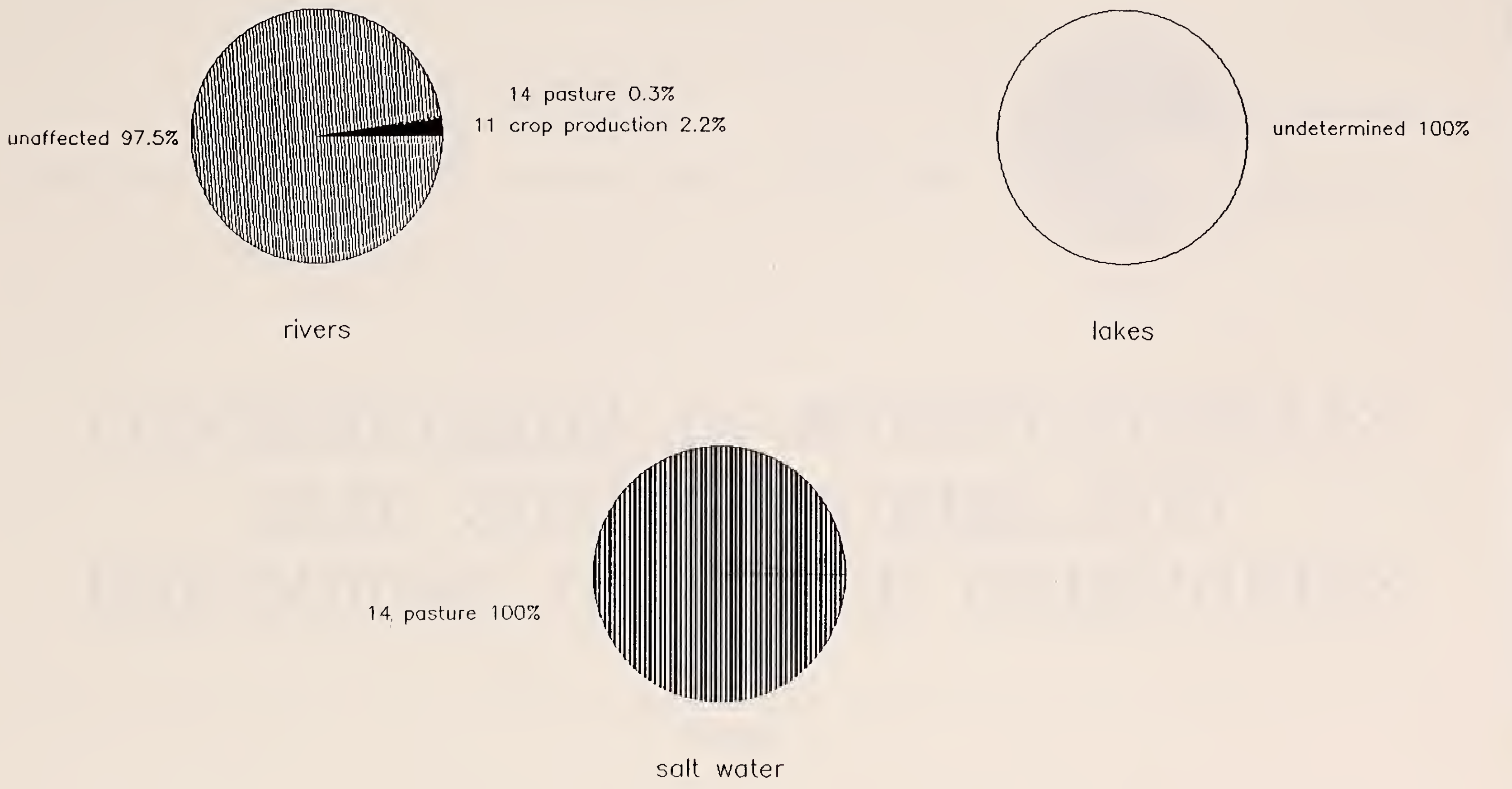


FIGURE 7

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR CONSTRUCTION IN MASSACHUSETTS

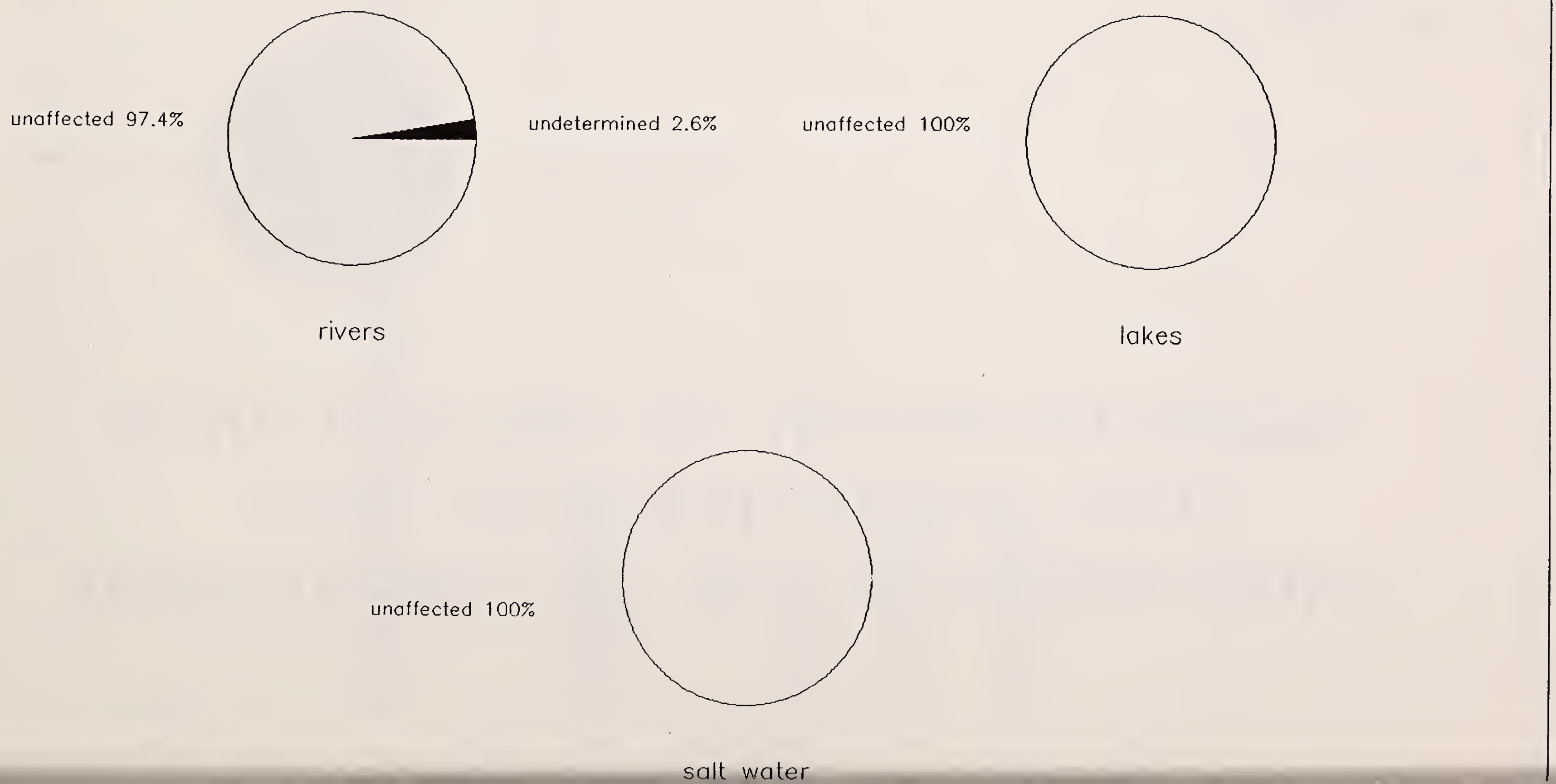


FIGURE 8

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR URBAN RUNOFF IN MASSACHUSETTS

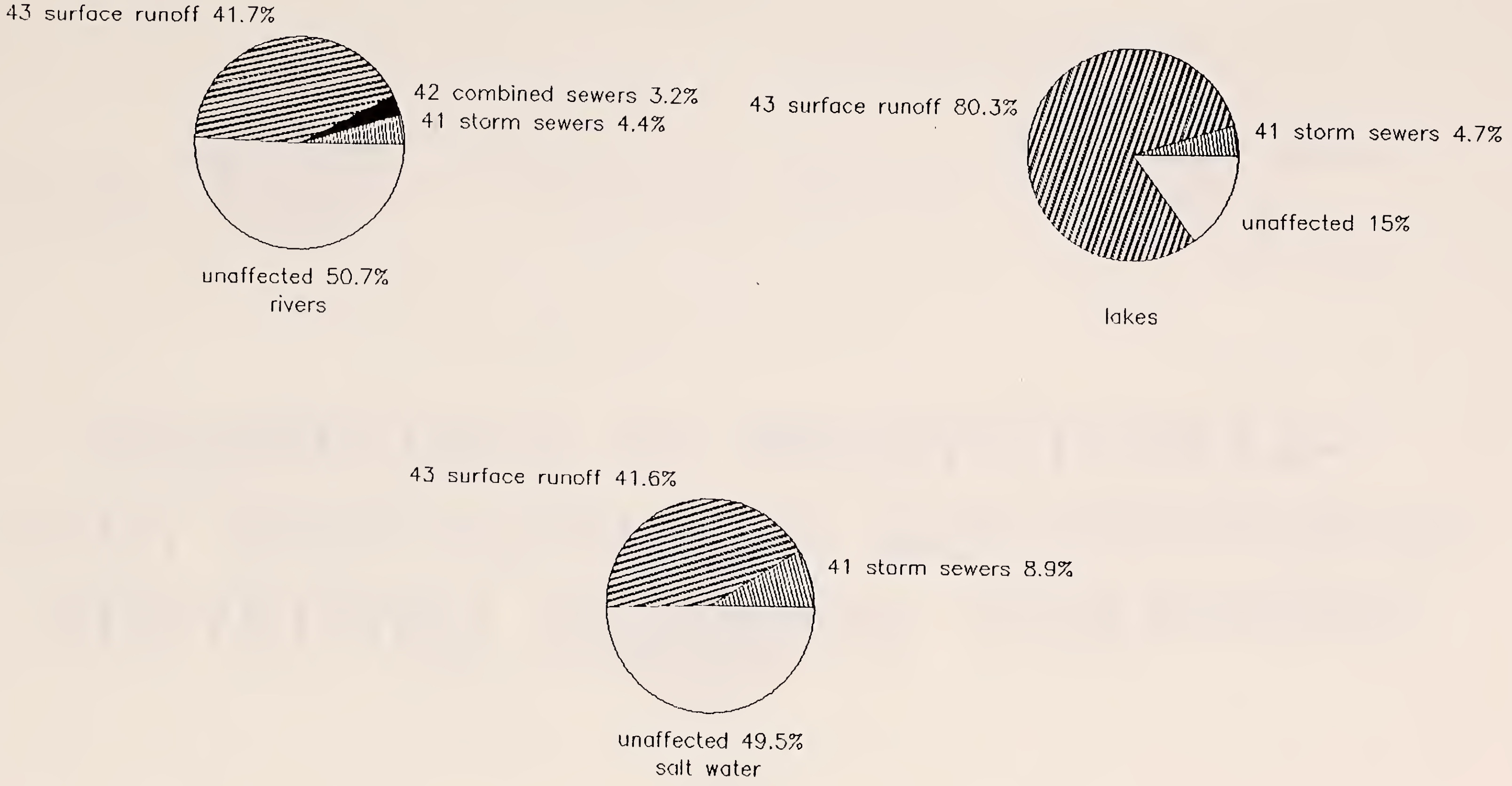


FIGURE 9

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR RESOURCE EXTRACTION IN MASSACHUSETTS

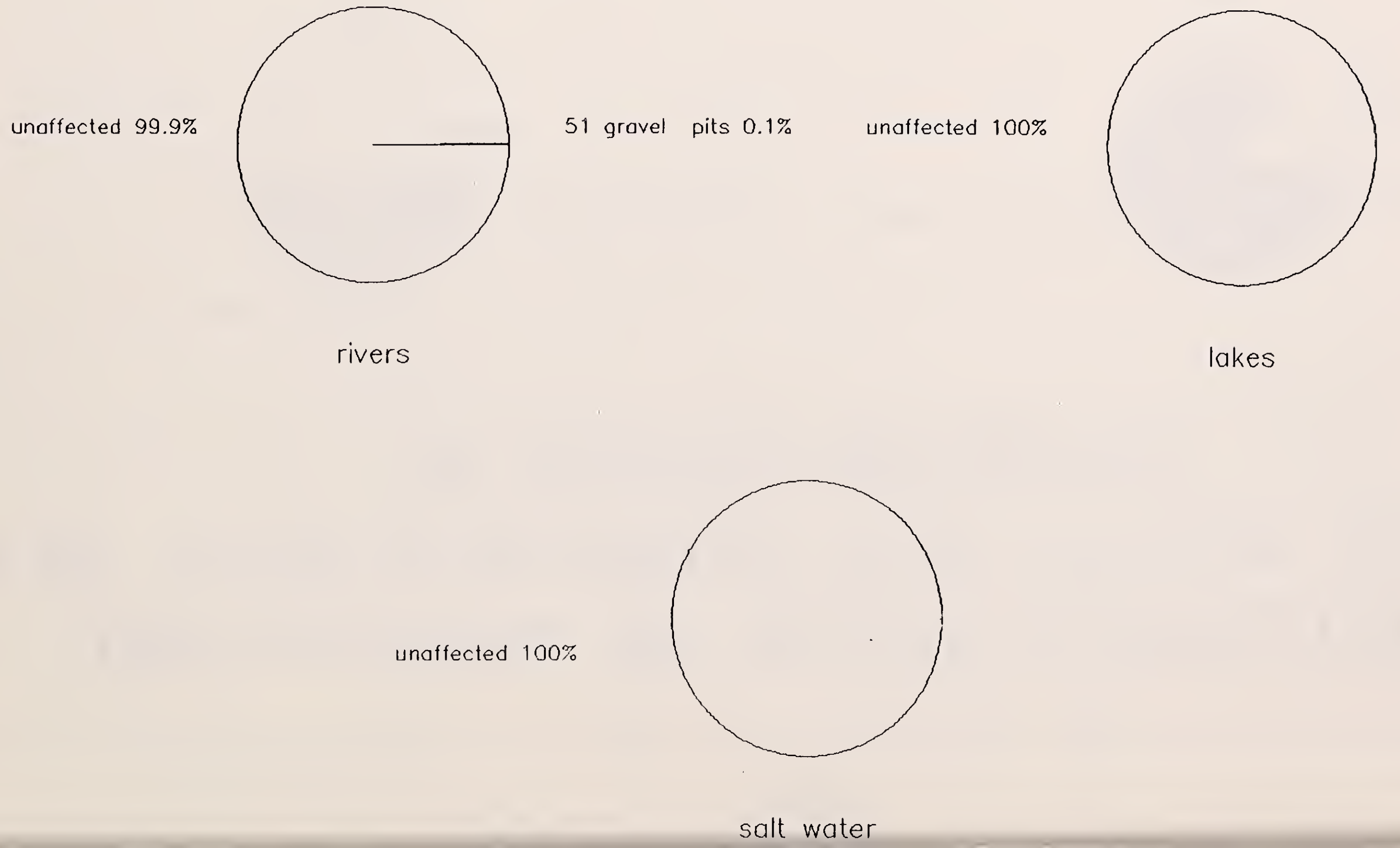


FIGURE 10

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR LAND DISPOSAL IN MASSACHUSETTS

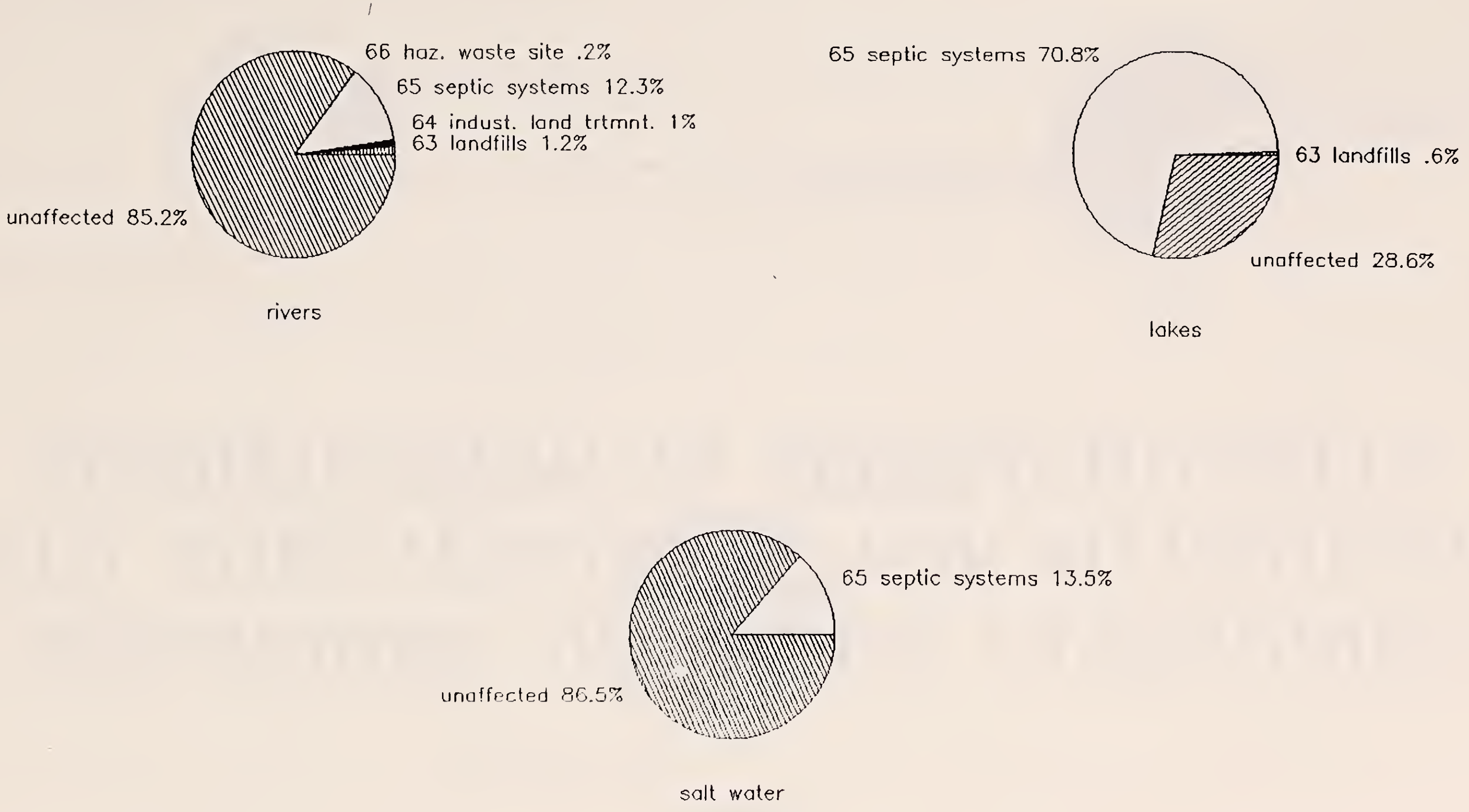


FIGURE 11

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR HYDROLOGIC MODIFICATION IN MASSACHUSETTS

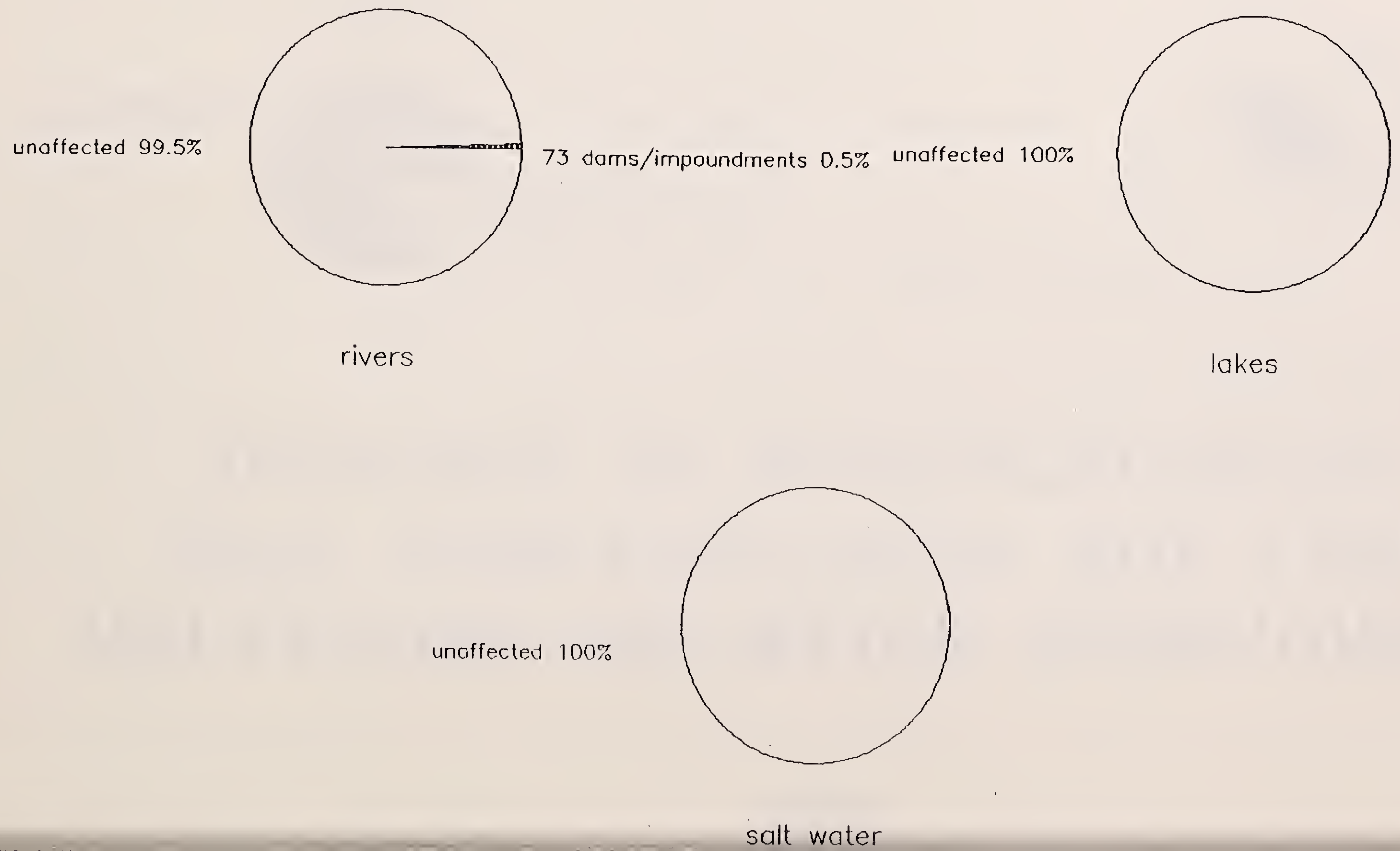


FIGURE 12

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR OTHER NONPOINT SOURCES IN MASSACHUSETTS

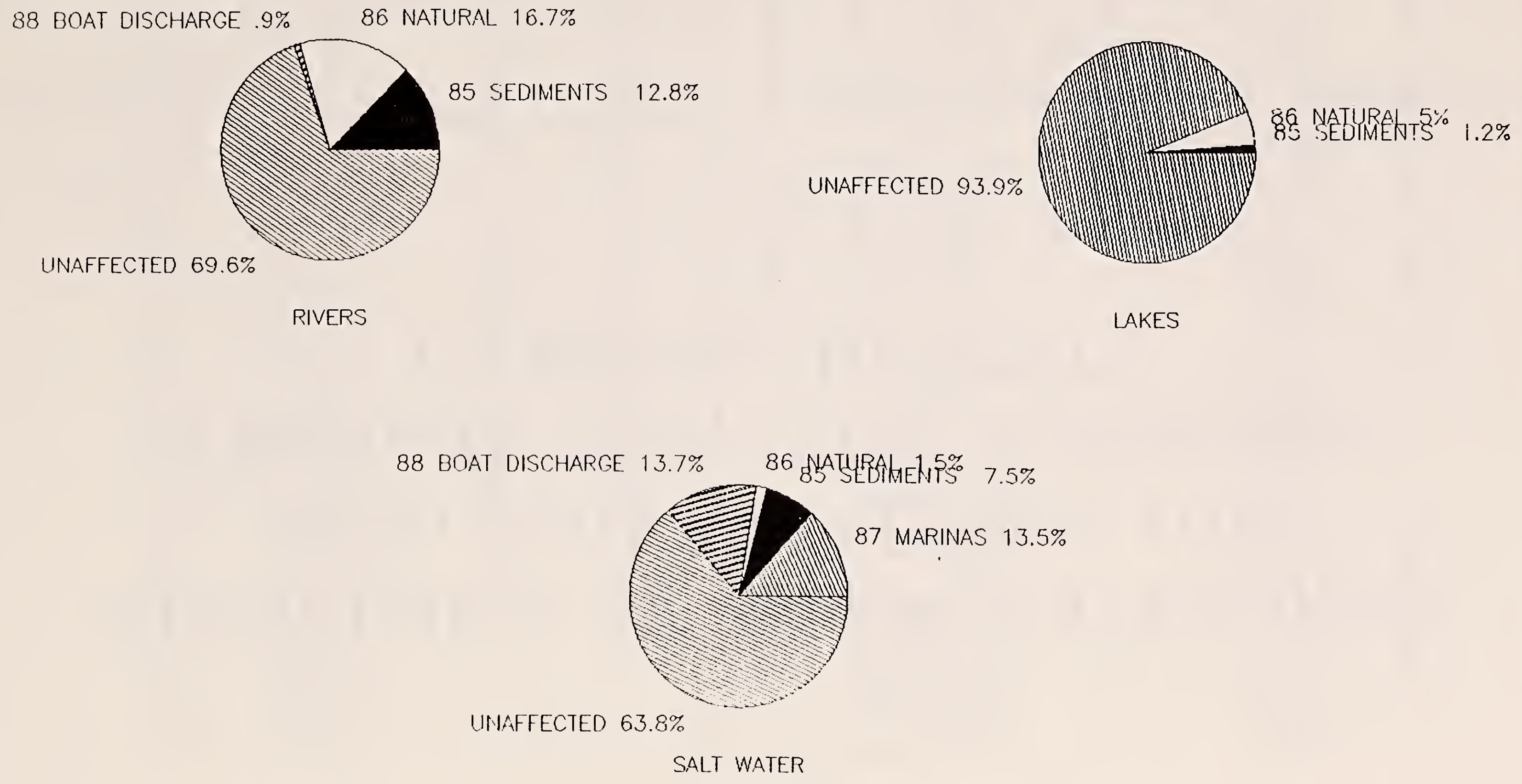
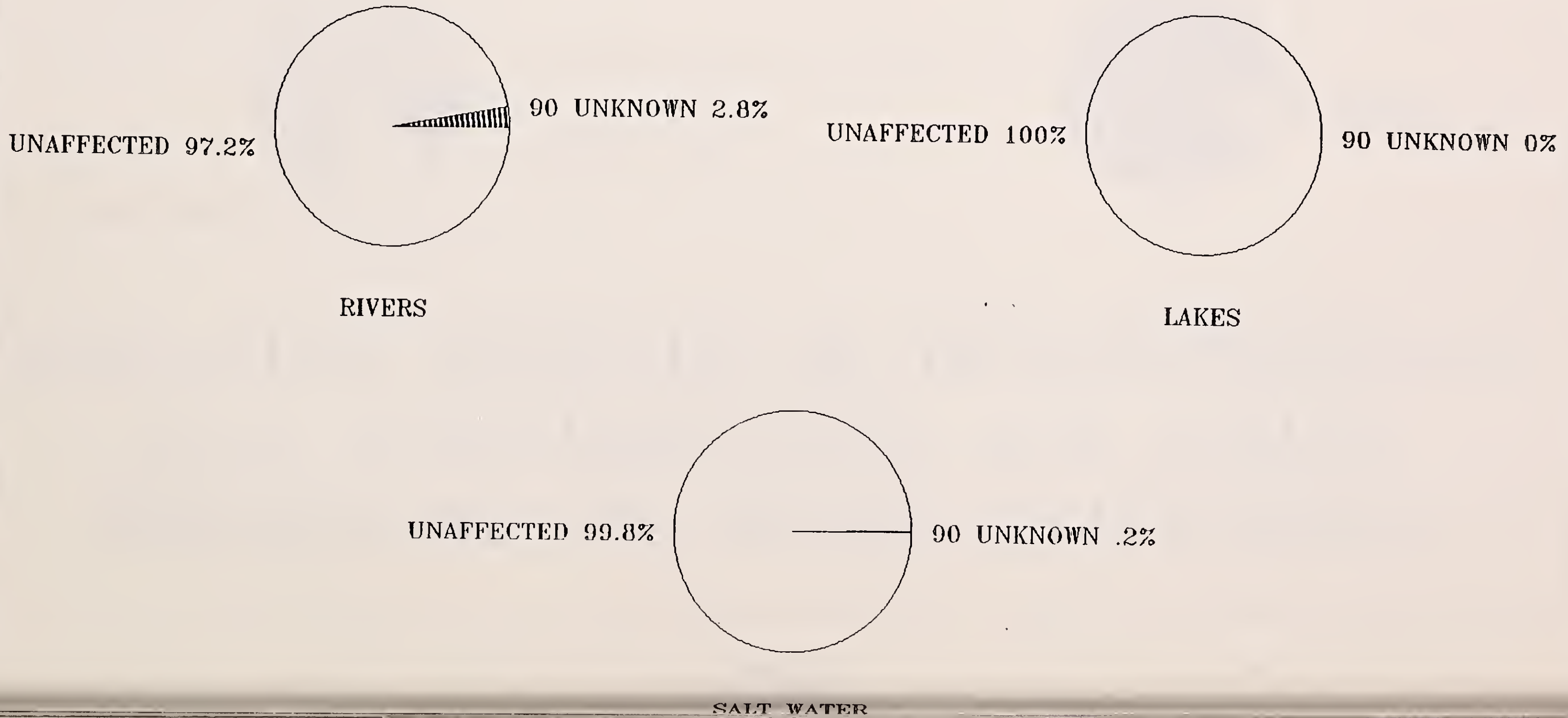


FIGURE 13

BREAKDOWN OF MAJOR CATEGORIES INTO SUBCATEGORIES FOR UNKNOWN NONPOINT PROBLEMS IN MASSACHUSETTS



III. The Plan

The Massachusetts nonpoint source management plan is basically composed of three parts:

A. An identification of the best management practices and measures which can be used to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source designated in the assessment report, taking into account the impact of the practice on groundwater quality.

B. Nonpoint source strategies - short term

C. Nonpoint source strategies - long term

Each of these parts will be discussed separately below.

A. Best management practices have been applied to the assessment report. There is the temptation to approach this task in a simple "cookbook" fashion which will not really accomplish much. We have attempted to be as specific as each problem warrants, keeping in mind the realization that some of the information is "monitored" and some is "evaluated." The best management practices data are presented in Appendix E.

B. Nonpoint source strategies short-term.

There are two levels upon which the so-called short term strategies will operate:

1. existing statwide programs, regulatory and nonregulatory, and -
2. targeted demonstration projects on a watershed basis.

Each will be discussed in turn.

1. Existing statewide programs: Regulatory and Nonregulatory

Silviculture
Nonpoint Source Background

o Harvesting - Approximately 90 percent of NPS silviculture pollution comes or results from harvesting operations. Erosion from access and skid roads, stream crossings, and log landings ends up as suspended or bed load sediments in streams, ponds and lakes. Clear cutting large areas may result in hydrologic modifications which may result in accelerated channel erosion.

o Reforestation - Site preparation may result in the temporary loss of cover and result in sheet and rill erosion. Use of herbicides to suppress existing vegetation may result in water contamination.

o Residue Management - There are occasional problems associated with disposal/storage practices of byproducts of the forests industry. Sawdust and wood chips or the effluents from such, could increase BOD in the receiving waters. Solids can settle out and destroy stream habitat.

Regulatory Background

The major mechanism for regulating forest cutting practices is contained in 304 CMR 11:00 which are statutorily authorized by M.G.L. Chapter 132, Sections 40-46. Together these sections are popularly called the "Cutting Practices Act." A good description of this act and the related regulations are attached to the plan as Appendix F. This regulatory mechanism does address the issue of nonpoint source pollution, although not by that name. The owner of any woodland must develop, for approval, a complete cutting plan along with a notice of intent to cut to the Division of Forests and Parks of the Department of Environmental Management. Failure to submit a plan, or to follow it once approved, can result in a per acre fine. The state (DEM) is responsible for approving the plan and inspecting the work to see that it is carried out properly. A stop order may be issued if cutting is not in accordance with the plan or with accepted practice or if work is at variance with legal requirements. In addition, timber harvesters must demonstrate familiarity with relevant laws before a license can be issued. The point being made here is that the present law and regulations can be effectively enforced.

The minimum forest cutting practice standards which appear in a land owner's plan must be followed while guidelines outline forest practices that, if followed, will further benefit both the owner and the public. It should be noted that once a guideline is in an approved plan it is legally binding on the land owner.

The relevant part of all this which directly pertains to nonpoint source controls is that the statute lists the forest values which contribute to the public interest. It is -

> "declared that the public welfare requires the rehabilitation, maintenance and protection of forest lands for the purpose of conserving water, preventing floods and soil erosion, improving the condition of wildlife and recreation, protecting and improving air and water quality, and providing a continuing and increasing supply of forest products..."
>
> (M.G.L.,C.132,5.40)

Perhaps even more importantly from a nonpoint source standpoint are the forest cutting practice standards set up by the state committee authorized under the act. The functional relationship between the forest and the values of interest are recognized:

> 'Conserving water', 'preventing floods and erosion' and 'protecting water quality' all are closely related and much affected by the watershed functions of a forest.

The assessment report has shown that on a statwide basis nonpoint source problems arising from silviculture are minimal. There are, however, certain localized areas where it is suspected as a problem.

It should be noted that there is currently underway a generic environmental impact report (GEIR) being prepared for the EOEA by the DEM - Division of Forest and Parks. This GEIR is considered an update of earlier studies, the latest one having been completed in 1978. The GEIR will explore, among other matters, whether a threshold should be established for minimum forest practice permits for which a Massachusetts Environmental Policy Act (MEPA) filing should be required. The final scope which this GEIR will include is as follows:

SCOPE

The generic EIR should follow the general guidance in 301 CMR 11.07 and shall contain the following sections:

I. Title Page

II. Table of Contents

III. Scope

IV. Executive Summary

V. Current Forest Situation in Massachusetts

  A. Description of the Environment Affected

    1. Topography, physiography, climate and soils
    2. Vegetation
    3. Wildlife resources
    4. Water resources
    5. Recreational use of land impacted by forest cutting - areas specifically managed for recreational use such as campgrounds, picnic areas, etc., are not included
    6. Aesthetic resources
    7. Economic environment

  B. Minimum Forest Cutting Practices Act Permitting Program

    1. Areas and activities requiring an approved cutting plan
    2. Areas and activities exempt from the Act
    3. Silvicultural practices - types of forest harvesting systems
    4. Minimum standards and guidelines (criteria for selection of silvicultural practices)

      a. Regeneration/harvest system
      b. Intermediate cuttings
      c. Buffer/filter strips for bordering vegetated wetlands
      d. High elevations
      e. Treatment of roadside areas

    - f. Steep Slopes
    - g. Wildlife habitat
    - h. Rare & endangered species

  - 5. Engineering/logging standards and guidelines

    - a. Truck road design, construction, maintenance and stabilization
    - b. Skid road location, use and stabilization
    - c. Landing design, location, use and stabilization
    - d. Stream (channel) crossings
    - e. Wetland operations
      - i. road construction (minimize)
      - ii. timing (frozen, dry, stable)
    - f. Protection of residual stand
    - g. Care in trucking

  - 6. Administrative Procedures

    - a. Notification to abutters/conservation commission
    - b. Waiting periods and inspections
    - c. Use of contracts
    - d. Appeals

C. Forest Management of DEM State Forest & Park Lands

  - 1. The Land Management Planning System

    - a. GOALS zones and provisional zones
      - i. associated vegetation management practices
      - ii. progress in zoning
      - iii. coordination with other plans and agencies (such as 313 River Basin Plan, Water Resources Commission), and review of coordination efforts
    - b. Detailed planning within zones
      - i. selection, timing and location of practices guided by CFI, stand analysis and risk assessment
      - ii. financial maturity
      - iii. timber contracts

  - 2. Implementing Management Plans

    - a. Coordination of multiple use, manpower scheduling, and progress/expansion needs
    - b. Contributions to state needs
      - i. wood products
      - ii. water resources
      - iii. wildlife
      - iv. recreation
      - v. employment

            - vi. value added
        - c. Contribution of M.C.I. forestry camps (Chapter 127, Section 83A)

VI. Potential Significant Impacts of Forest Management Practices on Environmental Elements

- A. Impacts of Cutting on the Environment and Available Mitigation
    - 1. Soils - erosion, compaction, nutrient leaching
    - 2. Vegetation - growth, development, quality, quantity, composition, rare & endangered species
    - 3. Wildlife - food quantity and quality, cover, rearing areas, rare & endangered species
    - 4. Water resources
        - a. Water supplies
            - i. amount and timing of runoff
            - ii. water quality (turbidity, nutrient load)
            - iii. fish/aquatic organism habitat
            - iv. rare & endangered species
        - b. Bordering vegetated wetlands
    - 5. Recreation - access, roads and trails, visual resources, disturbance, physical hazards
    - 6. Aesthetic resources - landscape appearance, diversity, stability, species composition, debris
    - 7. Historic, archeologic, and cultural resources - stone walls, structural remnants, boundary trees, forest types
    - 8. Physical impacts - noise, air quality, soil pollution
    - 9. Social impacts
        - a. micro- and macro-economic
        - b. land use and quality
        - c. siting of landings and timing of operation
    - 10. Indirect impacts - effects of recreational vehicle use on logging roads

- B. Appraisal and Control of Significant Environmental Impacts of the Forest Cutting Practices Permit Program
    - 1. Effectiveness of current practices to control impacts
        - a. DEM operations, staffing and training
        - b. Exemptions/evasions
        - c. Effectiveness of plan implementation (how closely was plan followed, and if followed, was it effective?)
            - i. on uplands
            - ii. on wetlands
            - iii. on water supplies
    - 2. Other significant impacts (soils, vegetation, wildlife water resources, recreation, aesthetic resources, historic, archeologic and cultural resources, physical impacts, and social impacts)

3. Alternative management strategies and mitigation potentials
4. Recommendations for program improvement
    a. Administrative
    b. Regulatory
    c. Legislative

C. Appraisal and Control of Significant Environmental Impacts of the State Forest Land Management Program

1. Effectiveness of current practices to control impacts; progress in implementation on state forest property
    a. Harvest schedules and allowable cut
    b. Maintenance of roads and boundary lines
    c. Adequacy of staffing and personnel
2. Significant impacts (soils, vegetation, wildlife, water resources, recreation, aesthetic resources, historic, archeologic and cultural resources, physical impacts, and social impacts)
3. Alternative management strategies and mitigation

4. Recommendations for program improvement

    a. Administrative
    b. Regulatory
    c. Legislative

VII. Implications of the GEIR for MEPA Threshold [11.16(8)]

VIII. Comments and Responses (Final GEIR only)

IX. Section 61 - A Draft Section 61 Finding must be included (Final GEIR only)

X. Appendices

A. Research Results

1. Outside consultants

    a. Water quality (turbidity)
    b. Implementation (execution & effectiveness) of plans in sample towns or areas
    c. Relationship between who is preparing plans and implementation of plans

2. In-house documents

    a. Who is preparing plans (foresters, loggers, landowners, etc.?)

    b. Percentage of plans incorporating wetlands and steep slope provisions

B. Literature Cited

Strategy The structure and intent of the cutting practices act and the relevant regulations provide an adequate framework to implement, on a case-by-case basis, best management practices to control nonpoint sources from forestry practices. Specifically, there appears to be adequate enforcement capability in the law and regulations to protect water quality from silviculture activities. The question is - are the enforcement capabilities being realized in a reasonable and effective manner?

The strategy will be to:

(1) Determine whether or not enforcement of the forest cutting practice standards is adequate to protect water quality. This must be determined through the State Forestry Committee (appointed by Governor), the Forests and Parks Advisory Committee (appointed by Director of Forests and Parks Division of DEM) and the Division of Forests and Parks itself. The information from the R&D Project described in (6) below will also be used to evaluate this issue.

(2) If enforcement appears generally adequate, then action of the nonpoint management plan will be to monitor, through contact with appropriate committees, organizations and field investigations, the situation to provide any technical or educational assistance as necessary.

(3) If enforcement appears generally inadequate, then action of the nonpoint management plan will be to determine, in conjunction with the above named entities, what resources or actions are necessary to improve enforcement of the situation.

(4) Following (3) above, implement on a cooperative basis with the above named entities appropriate procedures or methods to improve enforcement.

(5) Because the assessment report has indicated that water quality problems from silviculture nonpoint sources are not widespread, this area will not receive high priority.

(6) Although the assessment report did not identify major water quality problems arising from silviculture activities, the DWPC feels the available data are insufficient to make any really definitive statement. To address this, the DWPC is conducting a research and demonstration project (No. 88-03) to evaluate nonpoint source pollution problems from timber harvesting operations in the state. The project description, which is underway, is as follows:

MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL
Research and Demonstration Project 88-03

PROJECT TITLE: Evaluation of Nonpoint Source Pollution Problems from Timber Harvesting Operations in Massachusetts

Investigator: University of Massachusetts Department of Forestry and Wildlife Management

LOCATION: Central and Western Massachusetts

DESCRIPTION: An assessment of nonpoint source pollution from timber harvesting operations will be conducted. Field studies will be performed to document and evaluate the seasonal effects of timber harvesting equipment on stream water quality and wetlands, especially as it affects drinking water supplies.

Quantitative studies to be performed include:

(a) An experimental simulated stream crossing investigation at the MDC's Quabbin Reservation and Ware River Watersheds;

(b) an evaluation of on-going timber harvesting operations; and

(c) an assessment of previously harvested, inactive timber harvesting operations.

Sampling of large and small streams during both low stream-flow and high stream-flow conditions will be performed. A series of samplings under winter conditions of snow and/or frozen ground will also be conducted. Stream sampling will occur at upstream (control) and several representative downstream locations. Hydrologic data will be collected at the time of sampling to determine stream discharge.

Water samples collected will be tested for turbidity, pH, specific conductance, total solids, and selected nutrients.

COST: $92,261

FUNDING: $56,761 by the Division of Water Pollution Control
$22,000 by the Division of Forests and Parks
$13,500 by the Metropolitan District Commission

DURATION: October 1987 - December 1988

(7) The timing of this strategy will be outlined in the plan's milestone schedule (Section V).

Agriculture
Nonpoint Source Background

o Non-irrigated cropland - Pesticide contamination may result from the use of approved materials for enhanced production of crops. Major contaminants are herbicides, fumigants (EDB, Vorlex etc.) and land incorporated insecticides and nemacides (diazinon, aldecarb, etc.). Nutrient contamination results mostly from applications of inorganic and organic sources of nitrogen which is washed off or leaches into the ground water. Cropland is subject to sheet, rill, and gully erosion when runoff is not properly managed resulting in sediment deposition and phosphorous enrichment.

o Irrigated cropland - Contamination may occur from the same sources as above or by direct application of pesticides to water bodies particularly in the cranberry industry where bogs are not managed as a closed system.

o Specialty cropland - Examples include cranberry bogs, orchards, small fruit and farmland producing other minor speciality crops. Contamination causes may be unique for each crop depending on cultural requirements, insect and disease control requirements and management methods.

o Pasture land - Pollution may result due to overgrazing, grazing near waterways too close to channels, removal of riparian vegetation, overstocking of pasture land resulting in the loss of cover, and the direct discharge of animal manures to waterways and water bodies.

o Hayland - The potential exists for contamination due to surface runoff or infiltration of nutrients from applied fertilizers and manures.

o Animal Holding Areas - There is a high potential for the runoff of animal wastes where large volumes of animal wastes accumulate or infiltration of nutrients, bacteria, etc. to surface or ground water.

o Wash and Processing Water - Milk room washwater, crop cleaning and processing wash water have the potential for contaminating surface or ground water when not properly treated and disposed.

o Waste Application Areas - This applies to areas specifically identified for application of liquid agricultural waste such as milk room wastes, lagoon effluents and liquefied manures. There is potential for contamination by runoff and/or infiltration of bacteria, nutrients, and chemicals. This category also applies to areas specifically identified for approved applications of sludge, septage and other non-farm wastes.

Regulatory Background

Anyone who examines the various federal, state and regional agencies or organizations which deal with agricultural interests can easily become overwhelmed by what is out there. The programs and regulations are difficult to weed and sort out. An overview of most of the agricultural programs has been presented in the Assessment Report, page A.IV.9. One quickly realizes, however, that most of what is out there is aimed at assisting or supporting agricultural interests as opposed to being overly regulatory or restrictive. With this in mind, and the fact that this is a state nonpoint management plan, the key organization which will be used in addressing agricultural nonpoint source problems are the soil and water conservation districts. It will be necessary, however, to rely very heavily upon the State Department of Food and Agriculture, the United States Department of Agriculture (U.S.D.A.).

Agricultural Stabilization and Conservation Service (ASCS), Soil Conservation Service (SCS) and Cooperative Extension for assistance and their extensive conservation expertise. The assessment report has shown that water quality problems from agricultural sources are present and generally widespread. An excellent report on Mass. Agriculture and Water Quality helps identify agricultural nonpoint source problems. (USDA, SCS & Mass. WRC, 1984).

Strategy There exists extensive organizational expertise and practiced methodology to implement best management practices to control agricultural nonpoint sources. Each of the sixteen soil and water conservation districts will be involved in this plan insofar as they can select appropriate eligible projects from the assessment report which qualify according to the prioritization system described in a subsequent section of this plan. In other words, each conservation district will prioritize their agricultural or agricultural-related nonpoint source problems which are either demonstrably causing water quality problems or are demonstrably threatening to cause water quality problems. Once this first step is accomplished then the second step will involve the appropriate USDA agencies, State Department of Food and Agriculture and Division of Conservation Services to jointly recommend individually targeted implementation strategies. The DWPC nonpoint source program will coordinate this process and provide resources for implementation; provided, however, that resources are available. Implementation strategies under this section of the plan shall include implementing enforcement and regulatory activities, education, training, technical assistance and technology transfer programs. Construction or demonstration - type projects will be addressed in a later section of this plan (see III.B.2.).

Thus, the agricultural strategy will be implemented in the following steps:

1. Conservation districts select priority projects for implementation. Should use the assessment report and must be related to either causing or threatening to cause water quality problems. Strongly urged to use "Massachusetts Agricultural Water Quality Study." USDA, 1984.

2. Projects are reviewed by SCS, ASCS, Cooperative Extension, State Department of Food and Agriculture and Conservation Services and individual implementation strategy is devised. Coordinated by DWPC. This strategy will, to the maximum extent practicable, be developed on a watershed basis.

3. DWPC reviews project strategies for approval of funding, subject to availability of funds. This may include application for federal section 319 funds, if available.

4. DWPC monitors the project implementation through the conservation district(s).

5. Agricultural nonpoint sources are present and widespread, therefore this will receive priority. It will be the approach of the nonpoint source management plan that identified and prioritized pollution sources will be addressed first through BMP’s, education and technical assistance before regulatory or enforcement actions are considered.

6. The timing of this strategy will be outlined in the plan's milestone schedule (Section V).

Construction
Nonpoint Source Background

o Land development - Removal of existing vegetation and the excavation and grading operations associated with construction of residential, commercial and industrial areas, results in increased rates and volumes of runoff. Sheet, rill and gully erosion may result from these changes. Base flow volumes are frequently affected by extensive development of watershed areas.

o Highway, Bridges, Roads - New road construction frequently crosses or comes close to drainage ways, streams, and other waterbodies. Erosion of soil from disturbed areas may directly enter waters. Road reconstruction activities, including surfacing, ditch and slope maintenance can result in runoff of petroleum products and erosion of soil from disturbed areas. An increase in rates and volume of runoff may also be caused by the land use changes.

Regulatory Background

The major nonpoint source issue addressed hereunder will be erosion and sedimentation. The assessment report has indicated that water quality impairment from construction activities is minor. It must be pointed out however, that this statement holds true only for those waters assessed in the report. It is felt that water quality impairment from construction activities is of some greater significance in the tributary waters, i.e., localized. As will be discussed under long-term strategies, this plan will include resources allocated for the purpose of assessing and monitoring those waters currently unassessed (see also Assessment Report, page A-IV-1). Also, nonpoint sources from construction activities of highways, roads and bridges will be addressed under long-term strategies in a later section.

In terms of state regulatory programs that currently address this issue the foremost is the Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and regulations adopted thereunder. The law and regulations are administered by local conservation commissions which review applications (called Notices of Intent) for permits (called Orders of Conditions). The State Department of Environmental Quality Engineering hears appeals from conservation commission decisions.

The construction activity covered by the act is virtually any development activity including site preparation. The resources protected under the act are marshes, meadows, swamps and bogs which border any of a list of bodies of water (lakes, creeks, rivers, streams, ponds, estuaries, or the ocean). The statute also covers work on land subject to flooding as well as land subject to coastal storm flowage and tidal action and is thus much more than a "wetlands protection" statute.

The act covers any construction work within a 100-foot buffer zone. Work outside the 100-foot buffer zone can be regulated only after alteration of a resource area occurs. Thus, work altering wetlands and flood plains from a distance (as through changes in drainage, discharges of pollution, and siltation from erosion) require a permit only after the alteration takes place.

Enforcement of the act is initially vested in the local conservation commission and involves the issuing of "Enforcement Orders." Non-compliance can then be reported to the Department of Environmental Quality Engineering which has the authority to issue administrative penalties in the way of fines. Judicial enforcement is also possible.

A second tier of construction activity control involves local zoning or water resource protection bylaws. Under the Zoning Act (M.G.L. Chapter 41, Sections 81K to 81GG) towns and cities may adopt certain bylaws which can afford reasonable regulation of land use and protection of water resources from construction or development related nonpoint sources. Local zoning bylaws can be a powerful mechanism for regulating land use activities. Local governments can also adopt local wetlands protection bylaws which are stricter than the state law.

There currently does not exist any specific state legislation controlling erosion and sedimentation. But this may change in the very near future. A 1988 legislative bill, "An Act Controlling Erosion and Sedimentation in the Commonwealth" has passed the Joint Committee on Natural Resources and Agriculture, has wide support and a chance of making it through the legislature this year or the next. The proposed bill requires approval of an erosion and sedimentation plan by the local conservation commission for any alteration of more than 10,000 square feet of surface area or alteration of slopes greater than eight percent. The Conservation Districts, U.S. Department of Agriculture, Soil Conservation Service and State Commission for Soil, Water and Related Resources all have certain roles in plan preparation or approval. The proposed bill is attached as Appendix G.

Strategy The Wetlands Protection Act is a good solid means of protecting water resources within the limitations of the act itself (i.e. 100-foot buffer area). The proliferation of hay bales and silt screens seen at construction sites all over the state is evidence that action is being taken to control erosion and sedimentation from construction activity. At this time it is unknown whether or not there is a demonstrated need for any necessary additional resources to help enforce or administer the Wetlands Act. The Massachusetts Association of Conservation Commissions (MACC) does an excellent job in helping local commissions in this area. Action in this nonpoint management plan under this area shall be:

1. To determine in conjunction with the MACC and Division of Wetlands (within DEQE) the need for any resources to help implement or enforce the Wetlands Act as it may specifically relate to the control and prevention of nonpoint source pollution.

2. If there is a demonstrated need in this then the DWPC shall address the most effective means of using nonpoint program resources, if available, to meet that need.

3. To support and aid in the effort to have legislation enacted for the control of erosion and sedimentation. Efforts will be to coordinate with the Nonpoint Advisory Committee, MACC, SCD^{s}, State CSWRR, SCS and the legislature as appropriate.

4. If and when the erosion/sedimentation control bill becomes law, the NPS program will work with the SCDs, SCS, State CSWRR to implement the Act.

5. The timing of this strategy will be outlined in the plan's milestone section (Section V).

The strategy for addressing the need for any action relative to local zoning and subdivision regulations governing construction activities will be a long-term strategy on the Subdivision Control Law which will be discussed in detail in a subsequent section of this plan.

The state as a whole has experienced over the last five or so years a spirited period of growth. Local governments have become very aware and very sensitive to the issues surrounding growth. One such issue has been the adequacy of local zoning bylaws to reasonably address housing density, open space, drainage, groundwater protection, water pollution, traffic and similar topics. People seem to be positively addressing these issues as a means of preserving the overall quality of life in this state, especially in the more rural communities. In response to this heightened awareness of growth issues it is felt that the area of zoning bylaws is being addressed in an adequate manner. When towns or cities adopt limited density bylaws, aquifer protection bylaws, open space plans and the like they are instituting in a very real sense nonpoint source controls. Since these bylaws govern land use they may be considered protective nonpoint source controls by preventing the land use activities in the first place.

As mentioned, more will be said concerning the state's subdivision control law and its ability to protect water quality from sedimentation and erosion.

A third strategy for addressing construction related nonpoint sources will be to work with the State Commission for Conservation of Soil, Water and Related Resources and the State Conservation Districts to adopt and implement a five year natural resources action plan. This proposed plan directly addresses the impact of soil erosion and sedimentation on water quality. The approved content outline of the action plan is included here as Appendix H. The content outline shows that the scope of the plan is broad and covers agricultural and nonagricultural issues. The plan also directly mentions nonpoint source pollution and will effectively address it.

The strategy adopted in the present nonpoint management plan will be to:

1. Interface and assist the State Committee on Soil, Water and Related Resources and the Conservation Districts to develop the five year natural resources action plan. The content outline has been approved and now the plan itself must be written.

2. The nonpoint source program will assist in the implementation of the plan in whatever meaningful way it is able to. This assistance may take the form of assistance to provide training, educational material, technical assistance and the like.

3. The importance of protecting groundwater quality from nonpoint sources of pollution will be stressed in the development and implementation of the natural resources five year action plan.

4. The timing of this strategy will be outlined in the plan's milestone section (Section V).

Urban Runoff
Nonpoint Source Background

o Stormwater Sewers - Street drains receive runoff from the land, building roofs, pavement, and through infiltration from ground water. Street catch basins are often receptacles of accidental and illegal dumping of wastes including waste oils. As such, storm drains are a potential conduit for nearly any type and kind of natural or society generated pollutant. Past practices of locating drain outlets at ponds, streams and estuaries has resulted in direct contamination of water bodies.

o Surface Runoff - Pavements - This includes highways, roads, parking areas, malls and similar facilities. These areas produce and emit the same contaminants as are received by storm water drains.

o Surface Runoff - Turf Areas - These include lawns, parkland, recreational play areas, golf courses, etc. Contamination of runoff and groundwater from applied organic and inorganic fertilizers or pesticides and other materials such as wastes from domestic animals is a problem.

o Infiltration Wells and Basins - These include dry wells, catch basins, infiltration ponds and similar structures and devices designed to discharge untreated stormwater runoff, cooling water and similar discharges into the ground.

o Urban runoff is a major cause of eutrophication and bacterial contamination of the waters of the Commonwealth.

Regulatory Background

For the purposes of this management plan urban runoff will include storm sewers and surface runoff but not combined sewers. In Massachusetts combined sewers are considered point sources and are being addressed elsewhere under other programs.

The 1987 amendments to the Clean Water Act, approved in February, 1987, included a new subsection 402 (p) which sets up a municipal and industrial stormwater discharge permit program to be implemented over six years. The new subsection 402 (p) outlines those stormwater discharges which shall require a permit:

(A) A discharge with respect to which a permit has been issued under this section before the date of the enactment of this subsection.

(B) A discharge associated with industrial activity.

(C) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,00.

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

(E) A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

It is apparent that permits will be required for industrial stormwater discharges and the very large municipal discharges. In Massachusetts this leaves virtually thousands of stormwater discharges which would not require permits.

But Section 402 (p) does address all the other stormwater discharges for which permits are not required. In fact, by 1992 the EPA must issue regulations covering all such discharges to be regulated to protect water quality and establish a comprehensive program to regulate such designated sources. But all of this will take considerable time. The issue must be addressed now under the nonpoint source program but in such a way as to anticipate what the federal regulations may be so as not be cause inefficiency or duplication of effort.

The assessment report indicated that urban runoff is a definite nonpoint source problem in Massachusetts, especially the subcategory of surface runoff. In dealing with the problems of urban runoff we are fortunate to have the results available from the Nationwide Urban Runoff Program (Volume 1 - Final Report, 1983). This program was aimed at implementing practical solutions for urban runoff problems and monitoring the results.

Strategy The institutional and statutory framework for regulating urban run-off is not cohesive nor well coordinated in terms of purpose and direction. On the local level the Wetlands Protection Act, Subdivision Control Act, local zoning bylaws and Board of Health Regulations can address some of the situations. Urban runoff results from rainwater and snow melt that flows over city lots, lawns, streets, paved areas, rooftops and the like. The problem is that all this runoff and its associated nonpoint pollution load must go somewhere and must go quickly to prevent flooding or nuisance conditions. The "somewhere" is usually the closest available waterbody or watercourse. Runoff is usually solved in the most efficient and least costly way, and traditionally the purpose of controlling nonpoint source pollution was not a factor. The key to this problem, then, is education and technical assistance coupled with demonstration projects. The following strategy will include three approaches:

a. situation specific strategies;
b. a general statewide strategy; and
c. a long-term strategy

a. Situation specific strategies

A compelling and serious nonpoint source problem in the state is that of shellfish areas being closed due to nonpoint source runoff. The assessment report has shown this to be a growing problem which affects local economies in terms of the shellfish industry, recreation and tourism. The current regulatory program in DEQE allows for sanitary monitoring and closures but there exists no remedial program.

The situation specific strategies in this area include:

(1) the Buzzards Bay Project and Buttermilk Bay Project,

(2) a DWPC Research and Demonstration project on closed shellfish areas,

(3) an assessment of nonpoint sources impacting Waquoit Bay on Cape Cod,

(4) North River Nonpoint Source Project and

(5) development of a centralized EOEA data management system.

(1) Buzzards Bay Project

The Buzzards Bay project has operated for three years and has set a model for approaching coastal marine water quality problems.

The Buzzards Bay project began in 1985 with funding from the Federal Bays Program under EPA sponsorship. The goal of the Bays Project is to intensely investigate coastal environmental quality issues in a defined geographic area that is also an integral ecological system. The goals of the program are to define the nature of existing water quality problems, to develop management objectives for the Bays as a whole, to implement corrective actions in priority areas, to develop a long-term monitoring program to study trends, and to coordinate water quality related activities of local, state, and federal agencies. The Buzzards Bay Project has recognized nonpoint sources as an important contributor to the decline in water quality. Efforts to date have worked to identify the relative contribution from various sources of contaminants to the Bay and to identify research needs. Street surface runoff and failing septic systems have been identified as the leading sources of contamination in many areas of the Bays. Research efforts have questioned the validity of the coliform standards as an indicator of public health threat. Management goals have been developed to abate specific pollution inputs. Longer term impacts from coastal erosion, sediment transport, and sea-level rise are also being investigated. Full implementation of the recommended strategies depends on public input and support, as is needed for the nonpoint program.

EPA and the Commonwealth of Massachusetts have also recently agreed to establish and fund a Massachusetts - Cape Cod Bay Bays Program which would function in coastal waters from Gloucester to Provincetown. The goals and management structure are currently being developed by EOEA following the Buzzards Bay model.

Priority of Environmental Quality Issues

The many issues of coastal environmental quality need to be ranked in order of priority if limited resources are to be focused on the most urgent problems. Highest priority is given to environmental issues which meet as many of the following criteria as possible:

- impact other human uses of the Bay
- have Bay wide effects

- can be addressed with existing knowledge, with existing management structure and within existing budget restrictions

- are not sufficiently recognized by regulatory agencies as a problem or sufficiently addressed by previous studies.

Basic Precepts

The wise management of existing resources requires technical information. This information will be sought following certain basic principles:

- protection of existing uses

- restoration of previous uses where feasible

- consideration of the Bay as an integral system rather than a series of isolated embayments or problems

- rapid dissemination of technical information in the form of model bylaws or regulations

- continued research and monitoring as a coordinated effort involving state agencies and academic institutions

Objectives

- Define the nature and extent of existing and developing water quality problems in Buzzard Bay Sound.

- through broad-based discussion, articulate the environmental goals and objectives for specific embayments and the Bay as a whole.

- Develop and implement appropriate abatement and remedial actions for geographic areas with urgent water quality problems.

- Develop and implement a coordinated long-term monitoring program that can assess the effectiveness of specific action plans, determine environmental quality trends, and provide an early warning of change, especially to important living resources.

- Promote improved coordination of water quality-related activities and programs of local, state and federal agencies.

Long-Term Management Plan for Buzzards Bay:

The draft long-term plan for Buzzards bay is included in this plan as Appendix I.

The nonpoint source program supports the Buzzards Bay Project and will closely follow its progress. The Marine Section at TSB/DWPC is involved in the project and through this avenue the nonpoint program is actively involved in the Buzzards Bay Project.

Buttermilk Bay Project

An offspring of the Buzzards Bay Project is the Buttermilk Bay Project in the Towns of Bourne and Wareham. This project is sponsored and managed by the EPA. The project is designed to control stormwater runoff which is strongly suspected of causing the closure of shellfish beds in the Bay. The project will include construction of two stormwater treatment works in each town. The nonpoint source program will monitor this project very closely because of its relevancy to the Buzzards Bay Project and the DWPC Research and Demonstration Project on shellfish bed closures.

(2) DWPC R&D Shellfish Project

The DWPC has initiated a research and demonstration (R&D) project to specifically conduct a diagnostic/feasibility study of two shellfish areas. This study includes the following pertinent parts (The complete scope of work is attached to this plan as Appendix J):

Project Objective

The primary objective of this project is the design of a management structure for the assessment and control of nonpoint source pollution problems for use and implementation at the municipal level.

To meet this objective, the project will focus specifically on two study sites in Buzzards Bay with shellfishing resources in need of protection from nonpoint source water quality degradation. The study sites, the East Branch of the Westport River in Westport and Phinney's Harbor in Bourne, will serve as case studies for demonstrating the potential for managing nonpoint source pollution at the local level.

The end products of this project will be:

o an individually designed nonpoint source management plan presented in a written document for each of the two study sites; and

o a comprehensive guidance document which describes the institutional and technical framework for designing and implementing a nonpoint source management program in coastal areas of Massachusetts, using pertinent information from the two study sites to illustrate the process. This document will constitute the final report for the project.

The project involves four elements which are described in detail under project tasks:

o perform detailed site assessments and produce nonpoint source management documents for the two study sites;

o incorporate public and agency involvement in the assessment and planning process;

o produce comprehensive guidance document; and

o report on administration and management of the project.

The comprehensive guidance document is the key to the whole project as it applies to widespread implementation of the BMP's. The Scope of Work states that:

The Consultant will write a guidance document for use by the Division in assisting local Massachusetts governments in establishing nonpoint source management programs in coastal areas. The guide shall be written for a municip0al audience and shall detail step by step the process which should be followed to plan and implement a nonpoint source management program.

The document should address the scope of the new federal nonpoint source management program, Section 319 of the Clean Water Act and should:

o list major and minor categories of nonpoint source pollution common to Massachusetts coastal areas, with specific emphasis on the study sites;

o list current BMP's for each of those categories, with associated estimates of costs;

o identify methods to implement BMP's including regulation, enforcement, zoning, technical assistance, financial assistance, education, training, technical transfer, and demonstration projects;

o identify, where appropriate, legal and regulatory requirements which must be met or considered for each BMP, i.e., do construction projects need EIR's, or permits or licenses from state or federal agencies;

o identify sources of funding and other assistance on federal, state or local levels which support implementing nonpoint source management practices or techniques; and

o identify private and public agencies and organizations which have expertise in assessing or mitigating nonpoint sources of pollution.

This document should be clear, concise and easy to read, and should present information which is pertinent to towns and planning agencies in coastal areas of Massachusetts. And, as emphasized in the Scope of Work, "This project will serve as a prototype study for use in identifying nonpoint source pollution in coastal areas under the Commonwealth's nonpoint source management program."

Since the R&D project falls just short of implementation of the BMP's, it is the goal of this plan to implement the BMP's as a demonstration project, provided there are either federal 319 (h) or other funds available.

If the objective of improving the water quality and thereby opening previously closed shellfish areas and recreational areas is reached, then the R&D report and implementation report will be disseminated in an educational/technical assistance format to all those communities which are experiencing persistent water quality problems from urban runoff. There are many such communities in serious need of help in this regard and would probably respond very positively toward this project with some guidance from DWPC/TSB.

(3) Waquoit Bay NPS Assessment

The DWPC has also begun (1988) a water quality survey of Waquoit Bay (Cape Cod) and three of its tributaries to document nonpoint water quality conditions arising from urban activities.

The planned survey has the following major goals:

o To update the Divisions existing database of water quality conditions in a Cape Cod estuary. This data will provide a baseline and be used to document impacts of development. It will also include sampling of sediments and the water column in the vicinity of marinas.

o To determine loadings of nutrients from each of the three freshwater tributaries to Waquoit Bay and the fate of nutrients and their impacts on the biota.

o To identify land use patterns and to look for trends in nutrient and bacteria concentrations in each of the three subwatersheds.

(4) North River NPS Project

Another situation specific strategy to address urban runoff is the North River Nonpoint Source Project which is funded at about $35,000. The detailed work plan follows as presented by the consultant, GHR Engineering Associates, Inc. It is included here in such detail to show our commitment to well-defined nonpoint source projects.

1.0 Project Focus

This project will evaluate and recommend remedial action alternatives which can reduce or eliminate the discharge of high level bacterial and nutrient pollution in selected sections of the North River watershed. Due to the extent of the subject watershed and the funding limitations placed on the contractor, GHR feels that this study must necessarily be carefully conceived and planned to be specific, well-focused and practical.

GHR proposes to conduct this study in a hierarchical fashion, selecting the key issue and problem areas so that the most effective remediation can be accomplished earliest in the program. This is important for two reasons: 1) to ensure the best use of public funds, and 2) to achieve an early success so that public interest and involvement in nonpoint source management is enhanced.

We have tentatively identified four study areas which are being considered for source identification. These areas have been mentioned in the BSC report, our discussions in April, and from GHR's knowledge of the study area. These areas are as follows:

1. Dwelley's Creek area
2. Bridge Street, Marshfield
3. Up river of Curtis Creek Dam
4. First Herring Brook

Source identification, evaluation of best management practices and design must be performed at each site where remediation is proposed. However, in order to achieve practicable results within the budget, the study areas need to be prioritized.

We are proposing the following rating system which identifies the work to be performed, ranked from A to D, A being highest priority. The following tasks for each study area are thus prioritized as follows:

Study Area	Source ID	Evaluate Management Practices	Design
1. Dwelley's Creek	A	A	A
2. Bridge Street	A	A	B
3. Curtis Creek Dam	A	B	C
4. First Herring Brook	A	B	D

This work plan will accomplish all "A" rated tasks. The degree to which another tasks can be accomplished is directly dependent on the degree to which public agencies can be involved in the data collection tasks. Public involvement is important for a larger reason as well. GHR proposes to establish, through this project, a self-perpetuating program through which towns along the North River will be able to better manage nonpoint sources. Close agency involvement in this program and public education are the key elements to use to achieve this goal.

The specific tasks to be performed under this project are described in the following section.

2.0 Work Plan

2.1 Review and Analyze Existing Information

1. This task begins with a meeting between the GHR project team and North River Commission Task Force. The goal of this meeting is to introduce the project objectives and to identify contacts in each town which we may call upon for additional information and assistance.

2. Follow-up with contacts will be performed at individual towns to achieve the following objectives:

    a. assistance in problem definition
    b. management practices, ideas and suggestions
    c. coordinate field support activities

3. Collate collected data and assimilate into refining study limits.

4. Fly over the four study areas as a follow up to initial ground level surveys. An aerial view of the watershed provides an unparalleled vantage point for observing surfaces features and spatial relationships between potential sources and the drainage channels and receiving waters.

2.2 Define Study Limits

1. Based on information obtained through Task 2.1, GHR will produce an overlay plan on USGS quads delineating the areas to be studied. This overlay plan will be Project Deliverable 01.

2. Field data collection strategies and protocols will be developed for the subsequent field programs. Field teams will be identified using, as much as possible, local agents. All field teams will be trained in sampling techniques at the GHR laboratory in Lakeville where they will receive sampling equipment and record sheets. This is important in achieving consistency of results, interest in the program and sufficient education to encourage a self-perpetuating program.

2.3 Field Program

1. A site walk of each of the study areas will be conducted by GHR with representatives of the field tam. The purpose of these site walks will be to trace all visible drain lines, streams and ditches which pass through the study area. The site walks will provide an opportunity for the field team to point out known and suspected sources of pollution and to layout a sampling strategy which will effectively isolate either specific sources or small areas which appear to contribute high levels of bacterial pollution to the drainage system. For planning purposes we anticipate identifying 5 to 15 sampling points in each of the four drainage systems.

2. Two types of sampling survey will be conducted. The first type of survey will consist of collection of a time series of samples at the discharge point of each area during a storm event. Samples will be tested for fecal coliform bacteria and results will be correlated with rainfall intensity to determine the lag time between onset of rain and the occurrence of peak bacteria levels at the outlet. Based on these survey results a second source survey program will be designed to gather storm event samples from sampling stations which bracket suspected source areas. Samples will be collected during the time period when peak bacterial loading is anticipated in order to maximize the probability of isolating specific sources. A minimum of 2 source surveys will be conducted in the spring and fall seasons. In addition, follow up sampling will be conducted at specific locations where high bacterial loading is detected.

   All field sampling will be performed by local representatives on the field team under the supervision of GHR personnel. These individuals can respond quickly in the event of a sudden rainfall and can be relied on to provide similar support during future follow-up studies which will be an essential element of the North River clean-up effort.

3. Water quality analyses will consist primarily of fecal coliform testing by the membrane filter technique (FC-MF) on fresh water samples. This test has proven to be a reliable and economical indicator of bacterial pollution., Where high bacteria levels are encountered and a specific source is not obvious, additional bacteria testing will be done in an effort to identify the nature of the source. These tests will include fecal streptococcus enterococcus and E. Coli enumeration where appropriate. All testing will be performed in accordance with Standard Methods for the Examination of Water and Wastewater, 16th Edition, APHA 1985 or other methodology acceptable to the Client.

2.4 Identify Specific Pollution Sources or Source Areas Within the Study Locations

Information collected under Task 2.3 will be reviewed and evaluated in order to identify specific pollution sources in the selected study areas to the extent possible within the limitations of detection. These pollution sources will be identified on overlay maps accompanied by a brief review of the field program findings. This will comprise Project Deliverable 02.

2.5 Identify and Evaluate Alternatives for Nonpoint Source Management

1. The identification and evaluation of remedial alternatives proceeds in steps. The diagnostic portion of this study will identify pollution sources and pathways of bacterial loading. Restoration and management options, for both watershed and instream application will be screened to identify the remedial actions that most effectively address site problems and meet general goals and objectives. Remedial alternatives for consideration include a wide range of options such as:

1. Land and development rights acquisition
2. Protective zoning
3. Public education program
4. Water monitoring program
5. Physical containment of contaminants
6. Interception of contaminant plumes
7. Sewering and sewage treatment
8. Storm water management
9. Agricultural practices

Specific technologies to be considered are given in Table 2-1.

TABLE 2-1

TECHNOLOGY ALTERNATIVES FOR NONPOINT SOURCE MANAGEMENT

WATERSHED APPLICATIONS

Zoning/land use planning
Sanitary sewers
Stormwater diversion
Maintenance and upgrade of outdated disposal systems
Detention basins
Bank and slope stabilization
Increased street sweeping
Minimize lawn fertilizer use
Eliminate garbage disposal units
Eliminate phosphate detergents
Restrict boating activity

INSTREAM APPLICATIONS

Macrophyte harvesting
Biocidal treatment
Water level control
Habitat Management
Hypolimnetic aeration or withdrawal
Dredging
Bottom sealing or sediment treatment
Dilution and flushing
Nutrient inactivation

A key consideration in the screening of technologies is the ability of an alternative to meet general goals and objectives. GHR has identified the following goals for the study:

1. Slow or reverse the bacterial loading process.
2. Restore or maintain the general aesthetic quality of the river at the study locations.
3. Assure a minimal water quality of either primary or secondary recreational contact water.
4. Design a remediation plan which can be easily applied to other areas within the watershed.

Meeting any of these objectives, to a greater or lesser extent, will largely be determined by cost, by ease of operation of the controls, and agency and public input.

In order to factor all of the variables affecting remedial alternative screening and selection into our analyses GHR will use its detailed evaluation model for technology screening. This model has been applied to a range of feasibility studies from pond management to uncontrolled hazardous waste sites (where public scrutiny and interest are very keen). We believe that standardization is important so that experience gained through these case studies can have wider application in the North River watershed.

The following criteria will be used to assess remedial alternatives for the North River locations.

1. Technical Evaluation

    a. performance
    b. reliability
    c. implementability
    d. safety considerations

2. Institutional Evaluation

    a. applicable or relevant and appropriate regulatory requirements
    b. ability of alternative to attain water quality standards

3. Environmental Impact Evaluation

    a. beneficial effects of the alternative
    b. adverse effects of the alternative

4. Cost Evaluation

    a. capital costs
    b. operation and maintenance costs
    c. present worth analysis

    These detailed evaluations will provide the basis for regulatory agency and public review of remedial actions which could be applied to the North River.

The evaluation screening will result in a hierarchical rating of management practices and a draft proposal plan for the selected study sites. The screening and ranking of alternatives will be Project Deliverable No. 3. This report will be made available prior to the public information meetings.

2.6 Comprehensive NPS Management Report

A comprehensive report will be presented in sufficient detail, including conceptual design, to allow the NRC to implement and apply the recommendations in a logical and efficient manner. This report will be the final Project Deliverable No. 4.

2.7 Public Involvement

We are proposing that, as a minimum, GHR will support NRC at two public information meetings. We propose that these meetings be held after release of Project Deliverable No. 3, the ranking of alternative management practices. Further public involvement and attendance at Commission meetings must be decided upon as project needs and budget allow. We prefer to keep further details of this task undefined to retain as much flexibility in our approach as possible.

3.0 Quarterly Activity Summary

For purposes of this Work Plan we assume that the contract period will begin on July 1, 1988. The following is a detailed description of work proposed for each quarter.

3.1 First Quarter Work Projection (7/1-9/30)

1. Meet with North River Commission, identify local contacts.
2. Follow up with contacts at local level.
3. Conduct flyover of watershed.
4. Gather all available data and local comments.
5. Establish field sampling teams.
6. Develop field sampling program.
7. Conduct field team training in GHR Lakeville lab.
8. Produce Project Deliverable 01.

3.2 Second Quarter Work Projection (10/1-12/31)

1. Produce First Quarter Progress Report.
2. Conduct field sampling program and field engineering.
3. Perform lab analysis of samples.
4. Assess data, begin to delineate specific sources and source areas.

3.3 Third Quarter Work Projection (1/1-3/31)

1. Produce Second Quarter Progress Report.
2. Concentrate efforts on identifying specific sources or source areas.
3. Begin screening most feasible options for identified sources.

3.4 Fourth Quarter Work Projection (4/1-6/30)

1. Produce Third Quarter Progress Report.
2. Conduct spring sampling activities.
3. Lab analysis of latest sampling round.
4. Compete screening of feasible remedial alternatives.
5. Produce Project Deliverable 03.
6. Prepare outline of NPS Management plan, begin conceptual designs.

3.5 Fifth Quarter Work Projection (7/1-9/30)

1. Produce Fourth Quarter Progress Report.
2. Attend two public information meetings.
3. Prepare Draft Management Plan for client review.
4. Finalize Management Plan, produce as Project Deliverable 04.
5. Produce Project Summary Letter Report.

3.6 Work Breakdown Summary

The following is a breakdown of quarterly costs and person-hours for the tasks described above.

Task	Quarter 7/1	 10/1	 1/1	 4/1	 7/1
1. Review existing information	30				
2. Define Study Area	10	40			
3. Field Investigation	46	50		37	
4. Identify Sources			60	23	
5. Identify Alternatives			20	50	
6. Public Meeting					20
7. Develop Management Plan	10	16	30	40	76
8. Project Reporting	—	4	4	4	4
Total Hours	96	110	114	154	100
Total Dollars	$5,800	$4,905	$8,350	$9,190	$6,200

4.0 Project Deliverable Summary

The following details the deliverable which will be prepared under this contract. GHR assumes that six bound and one unbound copy of each will be produced. The unbound copy will be given to the client so that additional copies can be made as required.

Assuming that the contract period begins July 1, 1988, the following schedule of deliverable is proposed. Any change to the contract start date will necessarily affect this schedule.

Deliverable	Due Date
1. Project Deliverable 01. Overlay plan showing proposed study areas.	09/30/88
2. First Quarter Progress Report	10/12/88
3. Second Quarter Progress Report	01/11/89
4. Project Deliverable 02. Overlay plan showing specific pollution sources or source areas.	03/31/89

	Deliverable	Due Date
5.	Third Quarter Progress Report	04/12/89
6.	Project Deliverable 03. Remedial Alternatives Evaluation.	06/30/89
7.	Fourth Quarter Progress Report	07/12/89
8.	Project Deliverable 04. Draft Nonpoint Source Management Plan.	08/09/89
9.	Project Deliverable 04, Revision 1. Final NPS Management Plan.	09/29/89
10.	Project Summary Letter Report.	10/18/89

The Nonpoint Source Program, through the River Basins Section of the TSB/DWPC is overseeing this site specific project.

It is the stated objective of this management plan to implement the recommended BMP's from this North River Study. Initial implementation will depend upon availability of 205 (j) (5) or other funds.

(5) EOEA Data Management System development

The EOEA and Coastal Zone Management are currently developing a statewide program for research, testing and standards which is intended to coordinate the water quality data gathering efforts of all state and local agencies as well as private universities and other sources. The major goals are to standardize protocol and to centralize and increase the availability of the database. This effort will certainly benefit all the water agencies which accumulate vast amounts of water quality data. The nonpoint source program will definitely benefit from such an undertaking. Emphasis will also be placed upon sampling in an environmentally realistic context that will permit the detection of trends in space and time. The timing of the situation specific strategies will be outlined in the plan's milestone schedule section (Section V).

b. General Statewide Strategy

For an urban runoff strategy on a statewide basis the key institutional framework will be the Regional Planning Agencies (RPA's). The regional planning agencies are up-and-running entities with good knowledge of their areas and past experience with nonpoint source pollution. It was the RPA's who prepared and developed the so-called 208 reports for their respective planning areas. The DEQE developed the 208 plans for "non-designated" areas of the state. The agencies also have a good, detailed knowledge of their member communities from developing such things as transportation plans, master plans, recreation plans, zoning and growth control plans, open space plans and the like.

The general statewide urban runoff strategy will be implemented in the following steps:

- Regional Planning Agencies select priority projects for implementation. The RPA's should use the nonpoint source assessment report and 208 plans and the selected projects must be related to either causing or threatening to cause water quality problems.

- Projects are reviewed and endorsed by relevant city(s) or town(s), watershed association(s) and soil conservation district which results in an individual strategy plan. The strategy will, to the maximum extent practicable, be developed on a watershed basis. This effort is coordinated by DWPC.

- DWPC reviews project strategies for approval of funding, subject to the availability of funds. This may include application for federal section 319 funds, if available.

- DWPC monitors the project implementation through the regional planning agencies by means of progress reports and site meetings.

- The timing of this strategy will be outlined in the plan's milestone schedule (Section V).

It should be noted that, through funding from 205 (j) (1), 40% pass through, the DEQE will be funding each RPA to conduct groundwater protection projects. This effort is coordinated and managed by the DEQE's Deputy Commissioner's Office for programs. The DEQE believes that significant results can be achieved if all of the funds from this source are assigned toward upgrading groundwater protection efforts at the local level. This effort will coordinate very effectively with the nonpoint source role of the RPA's. An important aspect of designing BMP's for urban runoff projects is evaluating their impact on groundwater. Many of the potential nonpoint sources of groundwater pollution arise from urban runoff.

c. Long-term Strategy

The long-term strategy will involve stormwater runoff from roads and impervious surfaces and will be discussed under the separate section on long-term strategies.

Resource Extraction

Nonpoint Source Background

o Surface Extraction Areas - These are gravel pits, surface mines and similar areas. Exposed soil and mineral resources are subject to wind and water erosion. Both surface and groundwater hydrology may be changed due to these land use changes.

o Processing Facilities - Sorting, washing and other processing facilities or storage of extracted and waste resources may contribute dusts and solids to nearby waterways.

o Offshore drilling areas - These operations run the risk of releasing oil or related material to the offshore waters and thereby causing coastal pollution and marine fisheries habitat pollution.

Regulatory Background

Massachusetts does not have any mining operations on the scale of western United States nor does it have much mining activity of any type except for sand and gravel operations, lime plants and rock quarries. Mining represents less than 0.2 percent of the gross state product (GSP) (United States Department of

Interior, 1979). In terms of nonpoint source pollution this plan will focus on sand and gravel operations because the extent of any problem with the limestone plants and rock quarries is minimal or unknown. Historically there were also iron bog mines scattered over the state but these are long since defunct. Other indigenous mineral products from Massachusetts include clay, peat and gem stones (United States Department of Interior, 1979). Offshore drilling and mining activities are considered as point source discharges and are required to obtain NPDES permits for all discharges (sewage, deckwash, drilling mud, etc.).

The assessment report did not indicate any water quality problems from sand and gravel or related operations. But as mentioned earlier, only the main stems of the rivers have been assessed and not the tributaries. There is another concern relative to sand and gravel operations distinct from nonpoint source pollution of surface waters, and that concern is the protection of groundwater. It is well known that the best aquifers for water supply are composed of sand and gravel material. What you often end up with is two competing needs: water supply and aquifer protection and the economic worth of commercial mining of the sand and gravel. The Division of Water Supply within the DEQE is acutely aware of this and is aggressively addressing the issue. In terms of regulatory programs which affect sand and gravel mining there is a directly related one at the local level and an indirect one at the state level.

The local level regulations take the form of earth removal permits usually administered by the local zoning board of appeals. Such regulations, encompassed in the local zoning bylaws. generally cover the removal of sod, loam, clay, sand, gravel or any earth product, earth constitute or earth material from any land.

Indirectly, the state regulations apply to water supply protection or well head protection. As mentioned above, this public water supply protection which consists of regulations and departmental policy is primarily oriented toward protecting the drinking water quality. The regulations and policy affect land use around the well head and thereby can affect the mining of the sands and gravel in the aquifer surrounding and feeding the well. This program and the nonpoint source strategy will be further discussed as a separate item below. The nonpoint strategy relative to resource extraction of sand and gravel will be as follows:

Strategy This strategy will be aimed at providing educational and technical assistance to local authorities administering earth removal permits. The strategy will be coordinated by the DWS so that the issue of present and future water supplies can be addressed.

(1) Educational and technical assistance materials will be developed by the DWS relative to sand and gravel or related substances. The contents will include: (a) discussion of potential nonpoint source pollution from earth removal activities; (b) groundwater protection and the importance of sand and gravel aquifers for water supplies; and (c) suggested approaches to issuing earth removal permits in terms of special conditions to control nonpoint source pollution and protect groundwater.

(2) A series of statewide seminars or presentations by qualified geohydrologists coordinated through the Audubon Society on the subject of aquifer protection and resource extraction. These presentations would be

specifically tailored to local boards and committees to assist in local permit reviews, aquifer and groundwater protection bylaws and nonpoint source control or prevention. Overall coordination will be by DWS.

(3) Funding for this strategy may be from the DEQE, EPA (Section 319) Audubon Society or any combination thereof.

(4) The timing of this strategy will be outlined in the plans milestone schedule (Section V).

Land Disposal

Nonpoint Source Background

- Landfills - These include both operating and closed private and municipal landfills used for disposal of garbage and other residential, commercial and industrial wastes considered to be nonhazardous material. Surface runoff from these areas may contribute sediment to nearby waters plus transport a variety of contaminants washed from the material. The decomposition of these wastes generate large volumes of liquids which mix with the substances deposited to form a variety of compounds which may percolate to surface and subsurface waters.

- On Site Waste Systems - These are treatment systems characterized by a septic tank and effluent disposal system. Contributions of nutrients, particularly nitrogen and phosphorous to groundwater may occur. System failures commonly result in above ground breakouts of untreated leachate and may contaminate surface waters. Commercially sold septic tank additives are a source of toxic organic compounds.

- Hazardous Waste Areas - These may be located over defined or non-defined areas where hazardous wastes of chemical, biological, or mineral material is stored, has been stored, or spread on the land. Contamination of surface and groundwaters may result from runoff or percolation of water through the area.

- Organic Waters-Sludge-Septage - This includes treated and untreated plant and animal residues from food processing facilities such as fish gurry, and fruit pumace, as well as approved sludge from waste treatment plants and pumpings from septic tanks. Concentration of these materials in stockpiles or applications to the soil present a potential for runoff to surface waters. Some of these products are high in nitrogen which may be discharged to ground and surface waters. Heavy metals are often associated with sludge from treatment plants serving industrial customers.

Regulatory Background

For the purposes of this section of the management plan the discussion on nonpoint sources from land disposal will focus on landfills. The issue of septic systems will be addressed under long-term strategies.

The assessment report indicates that nonpoint source pollution of surface waters exists, but is not significant. Groundwater contamination, however, is another question. Groundwater monitoring around landfills in the state has until recently been minimal. Most the the state's data that do exist are from water supply wells. Because of the importance of groundwater and water supply the issue of land disposal is being included in this plan.

There are currently 193 active solid waste landfills in the state. Of these, 168 are single community landfills and 25 are commercially owned. Of the 168 municipal landfills, 23 are commercially operated. There are also 46 special waste landfills, accepting materials such as municipal and industrial sludge, demolition debris, incinerator ash, stumps, brush and the like. There are 589 inactive or abandoned solid waste landfills which stopped accepting waste over the past 25-50 years. Some two-thirds of the active landfills sit over groundwater supply aquifers.

In terms of contamination, as many as 40% of the state's active landfills are polluting surface or groundwater or are threatening to do so. At least eight communities have closed water supplies in recent years due at least in part to landfill contamination. Abandoned or inactive landfills (dumps) also pose a risk of groundwater contamination. Five former landfills are listed as federal superfund sites.

In short, the risk of contamination is real and the public awareness of this risk is high. But the situation concerning the management of landfills in the state has vastly improved and with the passage of the 1987 Solid Waste Act (Chapter 584, Acts of 1987) the situation will most decidedly improve even more.

The DEQE has regulatory authority over landfills and administers them through the Division of Solid Waste. There are separate regulations for solid waste landfills, land application of sludge and septage, incinerator ash and of course, hazardous substances.

The regulations for the disposal of solid waste by sanitary landfill (310 CMR 19:00) are comprehensive and are increasingly being enforced by the DEQE. Periodic examinations and evaluations of sanitary landfill operations are made by the DEQE and the owners are also required to have qualified sanitary engineers conduct [bimonthly] inspections for regulation compliance. Furthermore, the DSW is currently discussing and reviewing a revision of the regulations which would add much greater protection against groundwater contamination. A copy of the current regulations and the proposed regulations are attached as Appendix K.

The regulations for land application of sludge and septage (310 CMR 32:00 dated 11/10/83) are equally comprehensive and have specific water pollution protection sections. For example, no sludge or septage shall be applied within 2500 feet of any public water system or the high water mark of any Class A water with very few exceptions under very stringent parameters. Further, private wells are given a 300 foot radius and groundwater monitoring may be required. These regulations are attached in Appendix L.

The Solid Waste Act of 1987 can, in part, be considered a landfill nonpoint source control implementation plan. A major goal of the act is groundwater protection. First, DEQE will undertake a comprehensive statewide landfill assessment program which is the first of its kind in the state. If an assessment identifies that existing drinking water supplies have been contaminated by landfill leachate, or that groundwater is threatened by contamination, the act provides a combination of loans and grants to cities and towns for landfill closure and containment and groundwater clean-up.

The act also enables communities to take a number of measures to provide a new environmentally sound and cost-effective solid waste disposal capacity. The act provides strong incentives for recycling and composting facilities.

The act provides $260.5 million in financial assistance to cities and towns, as well as range of nonmonetary provisions to ensure that in the future, solid waste disposal facilities do not threaten the environment (groundwater) or human health. A copy of the Solid Waste Act is included here as Appendix M.

Hazardous Waste Sites

Many of the hazardous waste sites can be classified as nonpoint source pollution problems. For this reason reference to hazardous waste sites is made here in the nonpoint source management plan. The Division of Hazardous Waste (DHW) within the DEQE manages the hazardous waste program under the authority of M.G.L. Chapter 21E, the Massachusetts Superfund Law. The DHW is required to publish on a quarterly basis a "List of Confirmed Disposal Sites and Locations to be Investigated." The latest edition is dated July 1988 and is attached as Appendix N. The DHW manages the various projects as described in the report.

Many of the sites represent past spills, releases or discharges which are now in sediments and threatening to release back into the environment. A well known and large hazardous waste site is the New Bedford Harbor PCB site. This is actually being handled under the federal superfund program and is in the engineering feasibility study phase to evaluate dredging and disposal options for the contaminated sediments. This project constitutes part of the "record of decision" which will allow the EPA officials to make decisions on the final remedial action. This feasibility study will be completed by about July 1989 at a cost of some $4.5 Million.

A lesser known hazardous waste site is that of Atlas-Tack Company located on an estuary of Buzzards Bay in Fairhaven, MA. Apparently a historic process waste discharge from a lagoon has contaminated estuary sediments with cyanide, arsenic and possibly other contaminants. This site has become a candidate for designation as a federal superfund site. The point being made here is that many of these sites, although originally created by way of point source discharges, are now releasing or threatening to release contaminants as nonpoint sources of pollution.

Strategy In terms of a nonpoint source management plan to address landfills it appears that the existing regulations on land disposal and the new Solid Waste Act do in fact present a progressive plan which is being implemented. The strategy, therefore, shall be limited to the following:

(1) Assist, as needed, the DSW in the mandated statewide assessment of landfills. Such assistance may be as technical expertise or advice in the field of nonpoint sources, sampling techniques, methodology, review of assessment plan specifications or related tasks.

(2) Assist, as needed, the DSW in the implementation of projects for the clean up or protection of groundwater from landfills.

(3) Assist the DSW as necessary in the review, discussion, and rewrite of 310 CMR 19:00, the sanitary landfill regulations from the standpoint of nonpoint source control.

(4) Determine with DSW what specific needs exist to assist in enforcement of landfill regulations. Such assistance may take the form of field monitoring of water quality or nonpoint source educational or technical assistance to local Boards of Health, who generally have local authority over landfills.

(5) The nonpoint source program will identify and introduce itself to the DHW and will assist the Division as needed to provide, on a priority basis, water quality assessment and monitoring capability. The nonpoint source program will also provide technical assistance on best management practices used to contain or remedy hazardous waste sites.

(6) The timing of this strategy will be outlined in the plans milestone schedule (Section V).

Hydrologic/Habitat Modification
Nonpoint Source Background

(1) Channelization - Maintenance or construction of ditches, channels, rivers, etc., may result in direct discharges of soil and sediment to flowing waters. Non-stable channels, slopes, and spoil material may erode releasing sediments to water. Removal of riparian vegetation may cause temperature increases in water. Channelization may cause quicker concentration and release of water to downstream areas resulting in stream scouring or even increased flows and flooding.

(2) Dam Construction/Reconstruction - Earth moving and construction activities may result in soil erosion and sediment delivery to waters. Thermal and hydrologic modifications frequently occur where reservoir area or storage is large. Flooding of bogs may result in changes of pH of unbounded waters and release of nutrients.

(3) Earth Fills - Filling of wetlands and other natural storage areas may displace flood storage and alter peak downstream flows. Erosion of unstabilized fill may cause sedimentation in streams and lakes.

Regulatory Background

Nonpoint source pollution from this category does not appear to be of major concern in Massachusetts. The assessment report did not identify any water quality problems associated with this category or the following subcategories:

- o channelization
- o dam construction
- o flow regulation/modification
- o bridge construction
- o removal of riparian vegetation
- o stream bank modification/destabilization

Coastal dredging in Massachusetts may cause certain water quality problems in and around the disposal sites. Two sites often used in the past for coastal dredge spoils disposal have been (a) the "Foul Area" off the Massachusetts Bay and (b) a site within Buzzards Bay. Lately some potential coastal dredging projects have been postponed or put on hold due to the characterization of the sediments as containing hazardous waste (e.g. Boston Harbor).

Dredging operations are regulated by the U.S. Corps of Engineers under Section 404 of the Clean Water Act, by local conservation commissions under the Wetlands Protection Act, DEQE/DWPC under the Water Quality Certificate requirements, and DEQE, Division of Wetlands and Waterways under a Chapter 91 Waterways License and DEM, Division of Water Resources as trustee for the Ocean Sanctuaries Program under M.G.L., Chapter 132A.

Strategy The assessment report did not identify water quality problems associated with hydrologic/habitat modification nonpoint sources. This does not necessarily mean there are no problems. only that problems were not identifiable in the assessed waters. Of particular concern are any problems associated with coastal dredging operations. The strategy will therefore be:

(1) Coordinate with the DWPC/Technical Services Branch's Coastal Marine Program to determine whether or not any nonpoint problem exists with coastal dredging and the extent of the problem. This may require further water quality assessment, especially of the two identified sites.

(2) If a qualitative problem is identified, determine if the problem has a toxicity component.

(3) Coordinate with Division of Wetlands and Waterways (DEQE) a review of the regulatory program(s) to determine any change necessary to control nonpoint sources from coastal dredging activities.

(4) Coordinate through EOEA (CZM) and DEM's Division of Water Resources (for Ocean Sanctuary areas) the implementation of any recommended regulatory changes to control nonpoint source pollution to the marine waters from coastal dredging operations.

(5) The timing of this strategy will be outlined in the plan's milestone schedule (Section V).

Underground Storage Tanks - Background The issue of leaking underground storage tanks (UST) and groundwater protection has become increasingly visible and important during the last few years. A recent report by the Special Legislative Commission on Water Supply (Contamination in Municipal Water Supplies, 1986) indicates that eight municipalities in the state have had well closures due to motor and heating fuel spills and leaks. The Audubon Society reports this number to be nine. (Mass. Audubon Society, 1984). About 75 percent of the communities in the state and about 33 percent of the population depend at least in part on groundwater for drinking supplies. There are some 50,000 underground fuel tanks in the state, and it is estimated that about 20 percent of them leak each year (Mass. Audubon Society, 1984). There are three major reasons why tanks leak: (1) corrosion from exposure to external conditions; (2) corrosion or damage from the inside due to normal use; and (3) improper installation (Mass. Audubon Society, 1984).

A recent quarterly report (April, 1988) issued by DEQE's Office of Special Projects showed that of 639 confirmed hazardous material disposal sites, 419 - or 65.5 percent involved underground storage tank systems.

The following discussion on the federal and state regulations is taken from McGregor, 1988.

The 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA) created a national program for underground storage tanks, mandating that the U.S. EPA regulate underground storage of flammable petroleum products and hazardous substances. This extends federal law beyond basic hazardous waste and solid waste controls to govern for the first time the design, installation, maintenance and operation of underground storage tanks and responses to leaks and spills. Congress wanted this new regulatory thrust developed to address a major threat to groundwater in the United States from contamination from active and abandoned storage facilities. The focus is on release prevention, detection and correction.

Since the federal program authorizes and encourages states to run their own underground storage tank programs, Massachusetts has moved in that direction. Four agencies have pooled their legal powers to regulate tanks and containers.

The foundation for the Massachusetts program is a 1985 Memorandum of Agreement between the Board of Fire Prevention Regulations which promulgates rules preventing and minimizing fires and explosions; the State Fire Marshal who enforces these rules; the Commissioner of the Department of Public Safety which has similar powers; and the Commissioner of the Department of Environmental Quality Engineering (DEQE) which promulgates and enforces rules to prevent and minimize contamination of the environment and resulting dangers to public health, safety and welfare.

On May 8, 1985 the Governor designated the Massachusetts Department of Public Safety (DPS) to be the agency to which owners of underground storage tanks must give the notices required by the federal UST program.

The Massachusetts regulations (527 C.M.R. 9) apply to design, construction, installation, testing, and maintenance of tanks and containers. In addition to covering underground tanks, there are some specifications for above ground tanks. A copy of the regulations are attached as Appendix O.

These provisions, essentially preventing relining damaged underground storage tanks, allowing refusal of a permit in some environmentally sensitive areas, allowing the local fire department the option of requiring secondary containment or equivalent protection for new underground tanks, requiring closure of certain tanks temporarily abandoned, and assuming that tanks out-of-service for more than six months are abandoned (subject to mandatory closure and removal or filling with inert material if removal is not feasible) are very important and are examples of how a state may impose requirements more strict than the federal law.

A bill is pending in the Massachusetts legislature to create a Massachusetts UST program by statute. Since the original Memorandum of Agreement unites only existing agency authorities, a statute is needed to expand the program beyond flammable liquids and beyond petroleum to hazardous materials generally. The bill would confer DPS-type powers on DEQE and vice-versa; create a state licensing program for installers of underground storage tanks; and expand authority to prevent or remedy problems with tanks that may tend to become fire hazards, provide adequate safety for the public in the event of a fire, provide for the safe storage, use, handling and manufacturing of oil and hazardous materials in or near any tank, and broadly protect the public health, safety, welfare and the environment from any release of oil or hazardous material from a tank. Legislation is also being considered that would require the closure/removal of 20 year old tanks and a fund (from gasoline tax) to help finance local compliance.

Stricter and clearer storage tank system regulations to prevent disasters such as groundwater and drinking water contamination and explosions are on the way. The proposals for new regulations are being written by an interagency task force led by representatives from DEQE and the state fire marshal's office. The U.S. EPA, local fire departments, and the oil, gasoline and chemical industries are also represented on the task force. These regulations will replace the relatively new set put in place in 1986.

Some of the major points of the proposed regulations include:

o New secondary containment requirements that all new tanks and piping have secondary containment. Existing tanks and piping to be equipped with secondary containment according to a phased-in schedule. This means trenches or wrapping for pipes, and it could mean double wall construction or lined vaults for tanks. Both spill prevention (a containment manhole) and overfill prevention (automatic shut-off at "full" tank) will be required on new tanks and old tanks will have to retrofit.

o Installation procedures to be clarified; the fire marshal's office will provide a checklist for local fire departments to make sure tanks are put in correctly. According to EPA records, shoddy installation is the primary cause of leaks.

o Double walls (360°), no monitors for all UST's (as of 1/1/89) except for 1100 gallons or less tanks for heating purposes.

o Frequent to continuous leak-detection monitoring to be required. The existing regulations only require continuous monitoring on tanks located in sole-source aquifers.

o Spill and over-fill protection to be phased in; this would mean, for instance, installation of steel-lined basins or automatic "tank-full" sensors.

The regulations governing underground storage tanks are becoming comprehensive and impose rigid standards and criteria to control leaks and spills on a reasonable basis. The statutory basis for UST program is pending before the legislature. This is all well and good. From the standpoint of actual implementation and enforcement, however, the situation does not appear so firmly in control. Some of the weaknesses appear in areas of DEQE staff assigned to UST's (there is only one staff member in DEQE paid with federal funds, through the Department of Public Safety), lack of technology transfer and education to the town and cities for local awareness and enforcement and a lack of general understanding regarding the compelling purposes of regulating UST's (e.g., fire protection vs. groundwater protection).

Strategy The strategy on underground storage tanks, then, would be as follows:

(1) Include in the Fire Fighting Academy curriculum material and courses

relative to the environmental reasons for preventing UST leaks and spills. Also, impart a clear understanding of reporting requirements to fire chiefs regarding oil spills, tank leaks, and the like. Emphasize that protection of groundwater depends upon quickness of response and containment.

(2) Develop and implement a program within DEQE devoted to providing education and technical assistance to town fire departments and Boards of Health relative to UST's and groundwater protection. This process is currently being initiated (by Div. of Hazardous Waste - Office of Incident Response) and will be augumented through this management plan by the DEQE and Department of Public Safety. DEQE can use the Mass. Fire Prevention newsletter to communicate on current issues. Areas of the state considered as high risk due to sole source aquifer, limited water supplies etc. may be prioritized. The Conservation Law Foundation and Audubon Society should act as advisers to the program's functions, objectives and goals. Information regarding liability must be included. An important area that needs attention is the lack of enforcement of existing UST regulations. Technical assistance and perhaps a computer tracking program should be made available to local officials.

(3) This strategy will include an analysis of the issue of on-site consumptive use heating oil tanks. Technical and educational assistance ought to be made available for the option of local control of this very real potential threat to groundwater.

(4) Work toward a cooperative but clear delineation of authority between DPS and DEQE regarding UST's.

(5) The timing of this strategy will be outlined in the plans milestone schedule (Section V).

Road Deicing Chemicals Nonpoint source contamination of municipal water supplies and groundwater in general with sodium derived from deicing chemicals is well known. The health risk from elevated levels of sodium in drinking water is also well known. The single greatest potential source of sodium contamination of groundwater is the application of road salts in the winter as well as the storage of road salts.

The publicity resulting from this issue has raised the public awareness to the point where local and state officials have taken positive steps to reduce and control the problem. In 1981 the DEQE issued a report titled "Road Salts and Water Supplies - Best Management Practice." A copy of this report is included here as Appendix P. Since that report was issued progress has been made on controlling nonpoint source runoff of road salt. The State Department of Public Works (DPW) has continued its practice of reduced winter salt use in the vicinity of municipal water supplies, especially those with elevated sodium levels. The DPW is continuing to evaluate calcium magnesium acetate (CMA) on Route 25 in Wareham and old Route 140 in Freetown. The DPW has found that below 17° or 18°F the effectiveness of CMA is reduced and that it often requires twice the normal application rate to achieve results. The cost of CMA is also very high at about $650 per ton as compared to $28 per ton for sodium chloride. In 1987 the DPW used some 87,000 tons of CMA for evaluation purposes. The DPW has also been experimenting with "Verglimit," which combines a traditional asphalt cement wearing surface with calcium chloride pellets encapsulated in mineral oil. Developed in Switzerland in 1973, "Verglimit" has been tested mostly in colder climates. As traffic passes over the embedded surface, the pellets release controlled amounts of calcium chloride which prevents ice formation. Although tests so far indicate that "Verglimit" works satisfactorily, it too is a very expensive substitute for sodium chloride. Use of "Verglimit" generally triples the pavement materials expense. It may prove cost-effective in traditionally dangerous areas that are also environmentally sensitive to sodium.

In the area of salt storage sheds progress has also been made. About 200 of the 351 cities and towns in the state currently have salt storage sheds, including all the priority areas where elevated sodium levels posed a threat to public health. The state, through the transportation bond program, has provided financial assistance to cities and towns to construct salt storage sheds. Chapter 15 of the Acts of 1988, which is the most recent transportation bond program, included the following:

(1) five million dollars available to cities and towns for the construction of salt storage sheds; and

(2) one million dollars to alleviate the contamination of public or private water supplies caused by the DPW's storage and use of snow removal chemicals.

Strategy The assessment report identified water quality problems associated with deicing compounds in the section on public water supplies. The strategy then, will be as follows:

(1) Coordinate with the DWS to update and reissue to all cities and towns the 1981 report on road salts and water supplies. The Audubon Society and the Pioneer Valley Regional Planning Commission, which have issued similar information on deicing chemicals, will be asked to review and assist in this endeavor. Salt storage sheds should not be located within the Zone II of water supplies and a specified distance from surface waters.

(2) In conjunction with (1) above, highlight the issue of snow dumping. The sites selected for dumping of snow plowed from highways and parking areas must be chosen so as to minimize groundwater and surface water contamination.

(3) Work with the DWS and DPW to effectively assess and evaluate the use of CMA and the reduced salt areas near municipal water supplies. This strategy will take the form of field assessment by monitoring water quality. Such field assessment will be used by the DPW in formulating best management practices to control nonpoint sources of road salt runoff.

(4) Have DWS and DWPC review and comment upon the generic environmental impact report (GEIR) currently (1988) being developed by the DPW for policies and regulations on the use and storage of road salt.

(5) The timing of this strategy will be outlined in the plans milestone schedule (Section V).

2. Targeted Watershed Projects

The nonpoint source management plan requires a targeted watershed-demonstration project component. The purpose of this component is in keeping with the implementation spirit of the Clean Water Act's new Section 319. On a priority basis several demonstration projects will be chosen for implementation.

Initially, the number of projects selected for implementation will be ten. One of these projects will be the implementation of BMP's to restore a shellfish area as described earlier in this plan [see III.B.1.a.(2)]. Two projects will be selected for agricultural nonpoint source problems from the conservation districts, two projects will be selected for urban nonpoint source problems from the regional planning agencies and five projects will be selected by the Advisory Committee. Except for the shellfish area project, which is hereby declared a high priority, all candidate projects must be prioritized according to the NPS prioritization system. There will also be a timetable established for the selection process.

a. Prioritization System Each candidate project will be rated according to the following system with high score having high priority:

(1) Degree of water quality problem caused by NPS (must be sure it is a NPS problem).

RESTORATION	PRESERVATION
5 HIGH	0 HIGH
2 MEDIUM	3 MEDIUM
0 LOW	5 LOW

(2) Probability of successful control

5 HIGH
3 MEDIUM
0 LOW

(3) Cost-effectiveness

5 YES
1 NO

(4) Recreational use

5 HIGH
3 MEDIUM
1 LOW

(5) Economic benefit

5 HIGH
3 MEDIUM
1 LOW

(6) Water supply potential

5 PRIMARY
3 SECONDARY
1 NONE

(7) Environmental/public health risk from NPS problem

5 HIGH (IF PRESERVATION GIVE 5 POINTS)
3 MEDIUM
1 LOW

(8) Local or popular support

3 YES
0 NO

(9) Impact on groundwater

5 POSITIVE
3 NONE
0 NEGATIVE

b. Administrative Procedure For agricultural and urban runoff demonstration projects, these targeted projects are in addition to those described in earlier sections. In this case, each conservation district and regional planning agency will submit to the DWPC their preferred demonstration projects. The DWPC will select the final two projects for agricultural BMP's and the final two projects for urban runoff BMP's.

Each submittal must contain the following information:

(1) A description of the project, the waterbody(s) involved and the nonpoint sources. This must include reasons why this project is important.

(2) The best management practices which are proposed to improve or protect the water.

(3) Project total cost, broken down into logical cost categories.

(4) Expected benefits from successful implementation.

(5) Current use of the waterbody(s). May include past uses if relevant.

(6) Description of water supply information: primary, secondary, recharge area (Zone II), etc.

(7) Endorsement of local political authority.

(8) Accurate description of land ownership for proposed project site.

(9) Availability of funds to match any federal or state funds.

(10) (Other)

Submittals for candidate projects must be received six months from the date of program initiation which will follow EPA approval of this nonpoint management plan.

DWPC will select the final four projects (two from agriculture and two from urban runoff) in accordance with the prioritization system within three months of submittal.

Within this same nine month period the Advisory Committee shall select five projects for implementation using the same criteria.

Project funding will, of course, depend upon the availability of federal or state funding.

C. Nonpoint Source Strategies - Long-term

The long-term strategies are aimed at establishing or improving statutory or regulatory mechanisms for implementing nonpoint source controls. There are seven basic areas where attention has been and will be focused:

1. Revise Title 5 regulations for the subsurface disposal of sanitary sewage (septic systems).

2. Establish soil erosion/sedimentation control law.

3. Implement stormwater runoff controls.

   a. amend subdivision control law.
   b. amend Chapter 90 for local road maintenance and reconstruction.
   c. amend regulations on state/federal road construction/reconstruction.

4. Implement and enforce DEQE groundwater programs.

5. Implement Metropolitan Boston Water Supply watershed protection plan.

6. Update and expand Assessment Report.

7. Establish state nonpoint source program.

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1. Title 5 minimum requirements for the disposal of sanitary sewage. 310 CMR 15:00.

These regulations, enforced through local boards of health, govern the siting, design and construction of septic systems. Although this topic may be legally defined as a point source, we choose to address it here under the nonpoint source management plan because of its importance.

The assessment report identified septic systems as a problem, especially within lake watersheds. Although considered to be sufficiently stringent from an overall perspective of public health protection, additional safeguards to protect groundwater and surface waters must be considered. As land development and community growth continues at a vigorous pace in Massachusetts, the issue of groundwater and surface water protection from septic systems has become more serious and persistent. A recent publication by Cantor and Knox (1985) has set forth some of the major concerns revolving around septic systems and water quality:

Nitrates-Excessive concentrations of nitrates in drinking water may cause a bitter taste. Water from wells containing more than 45 mg/l of nitrates has been reported to cause methemoglobenemia in infants. Organic and ammonia nitrogen in wastewater can be converted to nitrate nitrogen within the septic tank system. [Note: Massachusetts maximum standard in drinking water is 10 mg/l].

Organic contaminants --Within recent years there have been several reported instances of organic contamination of ground water, with some cleaning solvents for septic tank systems being identified as potential sources (U.S. Environmental Protection Agency, May 1980). The chief concern relating to organic contaminants is that many of these substances are persistent within the subsurface environment and they are known to be carcinogenic above certain concentration levels. An example of one of these contaminants is trichloroethylene.

Metals (lead, tin, zinc, copper, iron, cadmium, and arsenic) -- The concern relating to various metals is associated with their potential toxic effects in excessive concentrations. This is pertinent in terms of ground water usage as drinking water and the movement of ground water into surface waters and subsequent effects on the aquatic ecosystem.

Inorganic contaminants (sodium, chlorides, potassium, calcium, magnesium, and sulfates) -- These inorganic constituents in excessive concentrations may cause undesirable health consequences ranging from laxative effects to aggravated cardiovascular or renal disease. These concerns are pertinent in terms of ground water usage as drinking water.

Reductions of phosphates were usually in the 25 to 50 percent range, much lower than those reported in the literature. This has special significance for lake shore septic tank systems since substantial amounts of phosphorus in the form of phosphates may be added to lakes, thereby causing eutrophication.

One aspect of the regulations which may need strengthening is that of proper care and maintenance of septic systems. The regulations themselves point out the importance of care and maintenance:

Specific, identifiable local conditions may require more stringent regulations to protect these interests. However, in the absence of such specific conditions, the following Code (Title 5) when properly enforced, should afford adequate protection. In general, enforcement, proper care and maintenance, rather than more stringent regulation, are the best means to assure that such systems will serve the purpose intended and prevent danger to public health and the environment.

Other aspects of the regulations which need to be reviewed in light of nonpoint source controls are set back distances to reservoirs and watercourses, required depth of pervious material, specified or qualified period of year for deep observation holes/percolation tests and others.

Although local Boards of Health may adopt stricter regulations than those of Title 5, it is often a difficult process due to local politics and the tough situation of enforcing regulations against one's neighbors.

The case can fairly be made for a uniform code at the state level for the town/city boards of Health to implement and enforce.

The strategy to address this situation shall include the following steps:

a. The DWPC will work with the task force established by EOEA to review and study Title 5 and develop revisions to recommend for promulgation to the Commissioner of DEQE.

b. Encourage and assist as appropriate the DEQE regional offices in developing and presenting seminars on Title 5 to local communities. This process of seminars does occur now and it should continue as an effective educational program for local officials to understand everything they can about the whys and wherefores of septic tanks and Title 5. Nonpoint source pollution control would be built into the presentation.

c. In conjunction with the above strategies, the DWPC will contract for two research and demonstration projects to add reliability and accuracy in determining maximum groundwater elevation for the purpose of siting septic systems (Title 5). One of the contractors (The U.S. geological Survey) will assist the DWPC with the training of DEQE staff, local officials, builders and engineers in the applications of water level data for the design and regulation of septic systems. Copies of the scope of work of the two research and demonstration projects are attached to this plan as Appendix Q.

2. Soil Erosion and Sedimentation Control Law.

A second long-term strategy to control nonpoint source pollution is to develop and have enacted by the legislature an erosion and sedimentation control law. This aspect of the plan has been previously described under the short-term strategy section on construction. The proposed bill currently before the legislature requires approval of an erosion and sedimentation plan by the local conservation commission for any alteration of more than 10,000 square feet of surface area or alteration of slopes greater than eight percent. The plan must first be certified by the appropriate conservation district. The current version of the proposed legislation is attached as Appendix G.

The nonpoint source program supports this effort as a long-term strategy to prevent and control water quality degradation from erosion and sedimentation. The DEQE will transmit, through the office of Legislative Affairs, its support of this legislation. An important aspect of this strategy concerns implementation of the legislation should it be enacted. The nonpoint source Advisory Committee can be a positive force in this regard The separate agencies which have roles to play in the proposed bill are represented on the Advisory Committee. It will take a concerted and coordinated effort to implement and administer the proposed program and the Advisory Committee can help see that all appropriate interests are included in the process. The nonpoint source program will work with the MACC and the conservation districts to implement the law if it is enacted by the legislature. Such help may take the form of financial assistance, if available, to provide educational material, technological information and similar items related to best management practices for preventing and controlling nonpoint pollutants from erosion and sedimentation. Efforts will be made to contact other area states with similar legislation or programs to gain from their experiences in implementation of the program. Appropriate assistance in the form of technical information on BMP's will be solicited from the EPA for dissemination to conservation commissions and conservation districts.

3. Implement Stormwater Runoff Controls

There are three areas where the normal way of doing business may be altered to provide stormwater runoff controls: (a) the Subdivision Control Law; (b) M.G.L. Chapter 90 program for state assistance to local communities for road maintenance, repair and improvement; and (c) the laws and regulations relative to maintenance, repair, reconstruction and construction of state, county and federal roads and highways.

a. The subdivision control law (M.G.L. Chap. 41, Section 81K-81GG).

This law is designed to ensure, among other things, that the roads servicing the subdivision are laid out and constructed in such fashion as to provide safe and adequate passage for the public. The subdivision control law is rather strict in its requirements and also requires that local planning boards adopt formal rules and regulations relating to road construction criteria. The concern of drainage, however, also comes under the jurisdiction of the local Board of Health which has certain approval powers over subdivisions. Historically, the major concern when reviewing subdivision plans was simply that adequate drainage from paved areas was provided. Recently, however, the issue of where that runoff goes has moved to the forefront. Concerns over siltation, sedimentation, eutrophication, aquifer protection, salt runoff and the like are being heard more and more often.

It is proposed that the subdivision control law be reviewed and suggested amendments be recommended which address the issue of stormwater runoff and nonpoint source controls. Many cities and towns currently require environmental impact studies of subdivisions. It is suggested that this process be formalized in the law itself under appropriate and reasonable criteria. In this way definitive subdivision plans would have to show best management practices for preventing or controlling stormwater runoff. This is not to say it is not done now, but it is not done in a consistent, reasonable formal way. Planning boards and Boards of Health could be given a manual on stormwater runoff BMP's to assist in the review process.

A related area where appropriate stormwater controls may be implemented is in the site plan review and special permit process for commercial and industrial development normally under the authority of Zoning Boards of Appeal (ZBA). Industrial parks, shopping malls and the like can generate tremendous amounts of stormwater runoff from the paved areas such as parking lots. This area of concern will be reviewed concurrently with the subdivision control law.

The DWPC and nonpoint source Advisory Committee, working with the Massachusetts Municipal Association would review the law and make recommendations for amendments. The MMA would then identify an appropriate legislator(s) to file legislation. If the legislative route is not deemed prudent, then educational material for local planning boards and ZBA's will be developed.

b. M.G.L. Chapter 90 Road Improvements.

In Massachusetts most of the so-called local road improvement is financed by a biannual transportation bond program through M.G.L. Chapter 90 rules and regulations. Cities and towns are allotted funds from the biannual bond issue according to a certain formula. Such local road improvements may require a local 25% match if the road in question is not a throughway in the city or town.

Much of the local road improvement work constitutes resurfacing or leveling coats of material. Some of the work is more fundamental such as grading, widening, sloping, drainage work and hardtopping. It is suggested that there is rarely much serious thought given to the possible effects of stormwater runoff during the design and implementation of local road improvement projects. The funds provided for the so-called Chapter 90 work are vital and very necessary to maintain and improve the states local road improvement other than normal maintenance.

It would appear that the issue of stormwater control on local roads could best be addressed at some juncture in the Chapter 90 road improvement process. One way may be to amend Chapter 90 so that prior to commencement of any local road work using Chapter 90 funds the local road commissioner or highway superintendent must have a nonpoint source stormwater management plan approved by the local Conservation Commission. The plan would be specific for each Chapter 90 project. The Conservation Commission may waive the plan for simple projects but would require best management practices for stormwater control on major reconstruction or any drainage projects. This also may be an opportunity to address local road salt practices. Since Chapter 90 funds are reimbursed by the state to cities and towns for road work completed, enforcement and compliance of this process could be instituted when the town selectmen or city council sign off on the reimbursement request. The reimbursement request would be approved by the selectmen or city council based upon a report of the Conservation Commission that the work was completed satisfactorily. The process should not be overly complicated or burdensome because the road work must proceed on schedule during the construction season. The nonpoint source program could supply Conservation Commissions with a manual on best management practices for stormwater runoff controls suitable for road work and typical drainage easements.

If cities and towns maintained or established a two-year road improvement plan, complete with public notices, then such advance planning based upon priority needs could allow the Conservation Commission adequate time to review the proposed road work and determine what, if any, BMP's ought to be implemented.

c. State, County and Federal Roadwork.

Other than local roads there are county, state and federal roads. For purposes of this discussion we will consider only the state and federal entities, since the counties, although legally owning certain roads in fee simple, do not conduct any maintenance or upkeep work on roads and are now maintained by the local governments or state Department of Public Works.

The state does control a considerable number of roads and is responsible for all maintenance, construction and reconstruction on these roads. There are also federal roads, or interstate highways, which the state, under agreement with the federal Department of Transportation, provides for maintenance, construction and reconstruction. The federal highways must be maintained, constructed and reconstructed, according to federal highway regulations and specifications. State roads must be maintained, constructed and reconstructed according to state regulations and specifications.

It is suggested that nonpoint source stormwater runoff controls for state and federal roads must be implemented into the system by the Executive Office of Transportation and Construction. Travelers along many of the recently constructed miles of interstate highways in the state have probably noticed the sedimentation basins built to treat the runoff. It is not known whether these are part of the normal road construction or add-ons resulting from the NEPA or MEPA review process.

To address the issue of implementing stormwater runoff BMP's on state and federal roads the following steps will be undertaken:

(1) Determine the present status of state/federal road construction/reconstruction regulations relative to controlling runoff. This task will be conducted in cooperation with the DWPC and state Department of Public Works.

(2) If regulations on the state level are inadequate then formulate and draft regulations which actively address the issue. If regulations on the state level are adequate, then formulate and draft a policy for better implementation. This task will be coordinated with the DWPC, state DPW and Executive Office of Transportation and Construction (EOTC).

(3) Determine applicability of state criteria/regulations to federal highway construction/reconstruction work to have such regulations apply if they do not already do so. This task will be coordinated with the DWPC and state EOTC. Federal highway regulations are very strict as to keeping road work within the allowed right-of-way. States must abide by the Department of Transportation (DOT) rules in order to leverage the federal highway funds. The right-of-way limits are often narrow and do not allow for placement of BMP's. This strategy will include representatives of EOTC, DEQE and EPA to meet with federal DOT representatives to develop a means of implementing BMP's with federal highway funds.

The Cambridge Reservoir offers a good example of the magnitude and expense of controlling highway nonpoint source runoff. This reservoir, which is Cambridge's water supply, has experienced elevated sodium levels from runoff of deicing chemicals predominantly from Interstate 95. The recently enacted transportation bond program provided $20 million to treat or eliminate the highway runoff into the reservoir. These funds are 100 percent state, however, because some of the work is outside the federal guidelines.

4. Groundwater Protection Strategy

Earlier in the plan the Massachusetts Groundwater Strategy was described (see Section I.C). The Water Resources Commission is the leader in this effort and will continue their efforts until there exists an adopted and implemented statewide groundwater strategy. The Nonpoint Source Program will assist the WRC in this endeavor in order to represent the issue of nonpoint source pollution and the various best management practice strategies. The nonpoint source management plan and the state groundwater strategy have parallel goals which is to provide a cross-purpose singular goal or objective to the myriad of activities conducted by many state agencies. They both strive for a cohesive spirit and common acknowledgment of purpose among the various regulatory, nonregulatory and grant programs that relate to water and water resources.

The formulation of a Massachusetts Groundwater Protection Strategy is considered a major part of this NPS management plan. What was presented in Section I.C. should be considered a part of the implementation plan. The work remaining before the task force is a second document which will address major policy issues relative to groundwater protection. This effort will present an approach, an orientation, a sense of direction as a framework to guide allocation of state resources and time. The Water Supply Task Force will continue to serve as the vehicle for drafting the strategy for consideration by the Water Resources Commission.

Policy issues identified for exploration include: The relative emphasis of managing risks vs. resources; drinking water vs. other groundwater uses; public vs. private water supplies; state vs. local roles and capabilities; and prevention vs. clean-up.

Most of the groundwater strategies mentioned in the task force report are included in this management plan under the appropriate topic. For direct groundwater protection programs, the remainder of this long-term strategy will focus on well head protection, the groundwater discharge permit program and the protection of groundwater from pesticides.

a. Well-Head Protection Program

(1) Background and Current Activities

The Massachusetts Department of Environmental Quality Engineering, Division of Water Supply (DWS), currently conducts a program to protect the quality of public supply wells and groundwater. This program is based on the State's Groundwater Protection Strategy. A key element of this strategy is the control of land uses which may adversely affect groundwater quality. The State's approach emphasizes protection of the recharge area of public supply wells, achieved through definition and delineation of three protection zones around the well. Since land development in Massachusetts is primarily regulated by individual municipalities, substantial emphasis is also placed on facilitating implementation of groundwater protection measures at the local level through technical assistance and grants programs.

In addition, the Water Resources Commission, Division of Water Resources administers Water Well Registration Regulations (313 CMR 3:00) which contain experience/educational and other requirements. Well drillers must register and obtain annual certification to operate in Massachusetts. A well drilling completion report is a requirement. A well or water well is defined as "any hole or shaft constructed into the ground for the purpose of extracting or injecting water. This definition shall not include wells to dewater excavations or stabilize hillside or earth embankments. It shall include wells which use heat pumps."

The Division of Water Supply Guidelines for Public Water Systems define three protection zones around public wells. Zone I, a 400-foot radius, must be owned or controlled by the water purveyor. Zone II, that area of an aquifer which contributes water to a well under the most severe recharge and pumping conditions that can be realistically anticipated, must be delineated by the purveyor prior to approval by the Division of a proposed new supply well. Zone III, that land area beyond Zone II from which surface and groundwater drain into Zone II, makes up the rest of the recharge area. An effort is being made to incorporate these zones into state programs regulating various waste sources. In addition, Massachusetts operates an Aquifer Land Acquisition Program (see Assessment Report, page A-IV-16) which provides state bond funds for municipalities to purchase land within the Zone II area for protection purposes. This program provides an incentive for towns to protect Zone II. The Division also helps towns to delineate their well head protection zones and pass protection ordinances through an active technical assistance effort and maintenance of a "Water Supply Protection Atlas" delineating locations of wells, waste sources, watershed, and aquifer characteristics on overlays for USGS quadrangle maps. The Division hopes to use Geographic Information System technology to update these maps and improve its risk assessment and analytic capabilities. (see No. 6 below for more on use of the GIS).

The Division of Water Supply also maintains an active technical assistance program to aid municipalities in protecting groundwater. Meetings are held with local committees and regulatory boards, with a focus on providing aid in development of ordinances controlling land use that could affect the quality of public supply wells. Zoning overlay districts have been commonly used in Massachusetts for this purpose. However, the definition of protection districts has varied widely. DWS staff now work to bring greater consistency and uniformity to these ordinances by promoting use of Zone II in local bylaws.

Only a limited number of Zone II's have been mapped through various DEQE programs. DEQE's managers were aware that mapping of the remaining existing wells might take many years to accomplish. Consequently, DEQE determined that an Interim Well-Head Protection Area needed to be adopted for use until Zone II was mapped for a particular source. While DWS needed such an area for its own programs, it was also strongly felt that a standardized interim protection area should be incorporated into all DEQE programs.

To be consistent with existing DWS policy that had used a 0.5 mile radius as an area whose land use was evaluated in sanitary surveys of water systems, DWS recommended that a radius of 0.5 miles be used as an interim protection area until a Zone II is calculated for a community well. This size was considered large enough to be conservative under most hydrogeologic conditions in Massachusetts. Based on a limited survey of reported contamination incidents, it was found that the distance from contamination sources to the wells ranged from 200 to 8,000 feet, with the majority greater than 400 feet.

The issue was discussed in the Department's inter-divisional Groundwater Protection Committee, and general agreement was reached on the concept of adopting an Interim Well-Head Protection Area. Accordingly, on August 27, 1987, the DEQE Commissioner issued a memorandum which established the 0.5 mile radius around a well head as an Interim Well-Head Protection Area. This area was to be used as an interim area of special protection unless or until a hydrogeologic study shows the actual Zone II boundaries to be otherwise. The memorandum stated that the Department will incorporate this Interim Well-Head

Protection Area (IWPA) into all appropriate programs and will encourage municipalities to adopt protective measures for this area in the absence of a delineated Zone II. The policy was reemphasized and expanded upon in a subsequent memorandum dated April 4, 1988 (see Appendix R).

To implement this policy, several substantive changes to DEQE regulations were recommended. Among the most significant of these addressed the siting of new and existing landfills. The memorandum stated that the Department should incorporate into its regulations that no new landfills would be sited within a Zone II, or Interim Well-Head Protection Area in absence of Zone II. An early phaseout of existing landfills in the above areas was also stated as DEQE policy.

The memorandum further stated that the Department would also "watch for opportunities to protect groundwater from the effects of all activities subject to federal, state, or local control that may be planned or already occurring within Zone II's or IWPAs, and educate and inform local officials to recognize the relationship between land use and water resource quality, and encourage municipalities to protect groundwater within Zone II's and IWPAs and areas with potentially productive aquifers."

Many of the land use activities that have adversely affected surface and groundwater supplies are nonpoint sources not directly regulated by DEQE. These include leachate and runoff from pesticide application, road salt application, septic systems, and fertilizers. To develop a database for evaluation of threats posed by these activities and aid towns to regulate them, DEQE/DWS developed the Water Supply Protection Atlas in 1984.

The Atlas consists of 4 transparent overlays for 176 U.S. Geologic Survey (USGS) quadrangle maps. The USGS maps portray topographic features such as land surface contours, rivers, lakes, and wetlands, as well as roads, buildings, and other man-made features. The four overlay maps additionally supply information on: Water Sources, Waste Sources, Aquifer Information, and Drainage Basin Boundaries. These manually-prepared overlays, combined with the USGS quadrangle base map, provide a means of associating water supplies with the geologic resources related to these water supplies and possible sources of contamination. The waste sources overlay identifies the location of numerous nonpoint sources which could potentially affect water supplies (salt storage areas, junk yards, landfills, open dumps, surface impoundments, and other categories).

The Water Supply Protection Atlas is available at the DEQE office in Boston, Woburn, Springfield, Worcester and Lakeville. In 1984, the Department provided overlays to each municipality in Massachusetts. The Atlas is accompanied by a handbook that explains the maps and their use in local planning.

DWS plans to update the Atlas to meet current needs. An important tool that could be used in this effort is a computerized geographic information system (GIS) work station, using ARC-INFO software, recently acquired by the DWS and DWPC. GIS technology allows maps to be prepared in computerized (digital) form and linked to tabular databases on the features of the mapped areas. It offers editing capabilities, the ability to overlay maps, and a variety of other evaluation techniques. DWS plans to use GIS technology to update the Water Sources layer of the Water Supply Protection Atlas as an initial priority. This work will be coordinated with the DWPC efforts on the updated Assessment

Report (see No. 6 below). Mapping work is currently concentrated on water supplies, landfills and other disposal and non-disposal sites, NPDES permits, groundwater discharge, permits, and hazardous waste facilities.

(2) Management Program for Nonpoint Source Control - Groundwater and Water Supply

The management program would have these basic focuses:

o Updating the available mapped database on nonpoint source locations (i.e., preparing a new statewide waste sources overlay of the Water Supply Protection Atlas).

o Providing focused technical assistance to communities on control of nonpoint sources potentially affecting wells and groundwater - in particular, pesticides, road salt, fertilizers, and potential sources of nitrate problems (septic system).

The initial task to be conducted would be to verify locations of and map nonpoint source locations not regulated by DEQE on a statewide basis (salt sheds, pesticide storage, salt piles, junk yards, etc.). Through a coordinated effort other point and nonpoint waste sources regulated by DEQE would be mapped simultaneously (i.e., landfills, hazardous waste sites under MGL 21E, Superfund sites, RCRA TSD facilities, surface and groundwater discharge permit locations, injection wells, and surface impoundments). All the waste source locations would then be incorporated into a single updated map set to be used for local and state planning and regulation of nonpoint sources, to be maintained on a GIS system and periodically updated.

The second major and ongoing task would be to carry out a technical assistance effort to help towns - which have the primary power to regulate land use - better manage and regulate nonpoint sources. The effort would include:

o Preparation and distribution of information on nonpoint source best management practices to protect groundwater, and making the revised waste sources maps available to towns.

o Aiding towns with passage of ordinances to protect groundwater and water supplies (i.e., nutrient loading performance standards, zoning overlay districts, Boards of Health regulations, etc.). A particular focus would be placed on protection of Zones I-III around public supply wells.

o Aiding towns to implement best management practices. For example, construction of salt storage sheds, drainage controls, and altered salt application procedures would be a possible means of controlling road salt.

The proposed program would improve the database available for nonpoint source control, increase its availability, and directly help in improved management of nonpoint sources affecting groundwater and wells. It would fill current gaps and permit Massachusetts to help control several significant nonpoint sources (particularly pesticides, road salt, and nutrients) that are not being currently addressed.

b. Groundwater Discharge Permit Program

On October 15, 1983, The Massachusetts Department of Environmental Quality Engineering (DEQE), Division of Water Pollution Control, promulgated two regulations establishing the Massachusetts Groundwater Discharge Permit Program and the Massachusetts Groundwater Quality Standards. These two regulations, respectively, identified as Title 314 of the Code of Massachusetts Regulations, Chapters 5.00 and 6.00 (314 CMR 5.00 and 6.00) were designed to protect all groundwaters of the Commonwealth. This permit program is, of course, a point source control program. It is described here as part of the nonpoint program to indicate the overall importance of groundwater protection and to describe the Commonwealth's comprehensive approach to the issue. Major features of the regulations include a statewide groundwater classification program and groundwater discharge permit enforcement authority. Under the former, a mechanism has been created for other classification of the Commonwealth's groundwaters with respect to protecting its most sensitive use. The three classes of groundwaters are:

Class I: Fresh groundwater found in the saturated zone of unconsolidated deposits or unconsolidated rock and bedrock and designated as a source of potable water supply.

Class II: Saline waters found in the saturated zone of the unconsolidated deposits or consolidated rock and bedrock are designated as source of potable mineral waters, for conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride or its derivatives or similar products.

Class III: Fresh or Saline waters found in the saturated zone of unconsolidated deposits or consolidated rock and bed rock and are designated for uses other than that as a source of potable water supply. At a minimum, the most sensitive use of these waters is as a source of non-potable water which may come in contact with, but is not ingested by humans.

Under 314 CMR 6.00, persons desiring a particular classification for a groundwater were given until January 1, 1985 to submit a petition of request to DEQE. DEQE is currently reviewing all such requests and will assign classifications based upon the submitted data. Groundwaters for which no specific classification petitions have been received will be designated as Class I, thereby affording protection to the most sensitive use - drinking water supply.

Reclassification may also be initiated by a petition which can be accepted at any time. Currently, 77 such petitions have been processed by the Department. Four (4) Class III designations have been granted.

All petitions must include certain minimum information including a description of the existing groundwater quality, current and potential uses of the groundwaters, identification of potentially affected water supplies, and a statement of need. Petitioners may also be required to submit a hydrogeologic study, the required detail of which will depend on the complexity of the area's geology, hydrology and the potential environmental impacts.

Standards for granting a Class III designation include the following:

(1) The groundwater impacted by the classification is under single ownership by the discharger proposing the classification; or

(2) The groundwater affected by the classification is not a present or potential source of drinking water because:

(a) the depth of location of the groundwater makes its use as drinking water economically or technologically infeasible; or

(b) the groundwater is sufficiently contaminated to make its recovery for drinking water use economically or technologically infeasible; or

(c) The discharge is located over a federally-defined Class III well mining area subject to subsidence or catastrophic collapse.

(3) The groundwater affected is a potential source of drinking water, but an alternate source is available and will be provided by the discharger proposing the classification to all existing and potential users of the aquifer affected by the discharge.

Furthermore, once all the above have been fully satisfied, the state will consider potential adverse effects on hydrologically connected surface and groundwaters. The state must take into account future as well as present uses of adjacent water and groundwater.

Currently, the protection of groundwater from point sources of pollution is accomplished through the Department's Groundwater Discharge Permit Program administered by the Division of Water Pollution Control. All dischargers of pollutants into the groundwaters require a wastewater discharge permit. This includes, but is not limited to: facilities discharging a liquid effluent below the land surface or into a percolation pit, pond or lagoon; facilities discharging a liquid effluent into leaching pits, galleries, chambers, trenches, fields and pipes; facilities discharging a liquid effluent into an injection well; any facility with an unlined pit, pond, lagoon or surface impoundment in which wastewaters or sludges are collected, stored, treated or disposed of; or conveyances that collect and convey stormwater runoff contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances or contact with a leaching facility. Since adoption of the 1983 regulations, the Department has received 405 permit applications and has issued approximately 311 final permits.

Discharges to Class I and Class II groundwaters must meet the more stringent of either the technology standards or the national primary and secondary drinking water standards. For parameters for which there are no drinking water standards, USEPA Health advisories are used as effluent concentration guidelines. Compounds which are considered toxic and for which there is neither a water quality standard nor a health advisory, are prohibited from discharge.

The discharge of sanitary wastewater in excess of 15,000 gallons-per-day requires a minimum of secondary wastewater treatment or its equivalent. All industrial process wastewater discharges are required to meet technology standards and the proposed treatment system must receive Department approval.

These measures serve to ensure that the permitted discharge will be in compliance with Class I or Class II standards.

Discharge to Class III groundwaters must also meet the more stringent of technology standards or water quality standards, but water quality standards for Class III groundwaters are determined on a case-by-case basis and are generally less stringent than those for Class I or Class II aquifers. Water quality standards for Class III groundwaters are determined based upon two most sensitive identifiable water uses. At a minimum, Class III groundwaters must meet water quality criteria based upon human exposure limits.

In Massachusetts, each permit must contain monitoring requirements to assure compliance with permit limitations and conditions. The Department of Environmental Quality Engineering determines the number of wells, location, dimensions, method of construction, and frequency of reporting on a case-by-case basis. The state has established guidelines for making these determinations, and the guidelines vary according to the type of facility and the aquifer type under consideration. For Class I and Class II groundwater, most of the monitoring will occur at the point where the effluent emerges from a treatment works, disposal system, outlet or point source prior to being discharged into the ground. For Class III groundwater, the state will require monitoring between the point source and the compliance boundary.

An integral part of the groundwater discharge permit program is the permit review process which encompasses all the divisions within the Department such as Water Supply, Water Pollution Control, and Hazardous Waste. The review process ensures that the environmental concerns particular to each division within the Department are considered and addressed.

Implementation of the Department's Administrative Penalty Program began on September 2, 1986. Authority granted under the Administrative Penalty Statute allows the Division to assess civil penalties up to $25,000 per day of violation per violation of permit limitations as well as unpermitted discharges. In excess of $300,000 has been assessed by the groundwater section in a total of 17 cases. This program has proven to be a very effective tool in addressing noncompliance cases as well as providing an extra incentive to permittees to maintain compliance.

c. Protection of Groundwater from Pesticides

The following is a DRAFT plan by the Department of Food and Agriculture to protect groundwater from pesticides.

I. PRELUDE

Today ground water protection poses a major environmental challenge. Ground water is the major source of drinking water for a large number of homes in the Commonwealth. Ground water provides drinking water for both private homes and public water supplies. There are 275 communities in Massachusetts which rely totally, or in part, on groundwater for their potable water.

In addition there are 58 communities with no public water systems which rely almost exclusively on ground water to provide their drinking water.

Ground water is a valuable resource for the Commonwealth of Massachusetts which has been shown to be vulnerable to pesticide contamination from spills, disposal, storage and normal use. Ground water once contaminated often remains undetected for long periods of time which may pose a health hazard to the public and is technically difficult if not prohibitively expensive to restore. Alternative sources of drinking water can be difficult to obtain and in most cases expensive to provide. Therefore, ground water protection efforts must be directed to preventing unacceptable contamination.

Successful groundwater management depends on the ability of federal, state, and local governments and their agencies to develop and implement comprehensive groundwater protection and conservation strategies. Such programs must be fully coordinated and include a greater emphasis on land use planning, the development of aquifer protection plans, the identification of potential future water supplies, as well as intensified efforts of pesticide management.

The goal of the Department of Food and Agriculture is to protect the ground water resources of the Commonwealth of Massachusetts by preventing unacceptable contamination of current or potential sources of drinking water. The Department will use health based guidelines, MCLs, or other criteria in assessing unacceptable contamination of groundwater.

The Department of Food and Agriculture pursuant of its authority under M.G.L. Ch. 132 (b), is initiating a plan for the protection of groundwater from pesticides. The purpose of this document is to define the policies of the Department of Food and Agriculture and to outline the procedures which the Department intends to implement to protect the Commonwealth's groundwater from pesticide contamination.

The scope of the strategy, described in the following pages, is limited to the pesticide component of groundwater protection. Therefore, it is to be considered as only one component of the overall Commonwealth of Massachusetts groundwater protection initiative.

The Department intends to coordinate the implementation of this strategy with the Departments of Environmental Quality Engineering and Public Health through the Interagency Task Force on Pesticides and Groundwater. This will assure optimal use of state resources and coordination between the participating agencies.

II. INTRODUCTION

In the past most environmental concern was focused on protecting our air, surface waters and natural resources. Pollutants which we could see or smell were of primary concern. Sources of contamination which affected our air and surface waters were studied and regulations were established to limit their effects. Groundwater, however, was rarely mentioned as a concern presumably because it was hidden from view and few knew or could see the effects of contamination. Landfills, hazardous waste dumps, underground storage tanks, industrial waste lagoons, chemical spills and most recently pesticides have been shown to adversely affect groundwater. Increased reports of groundwater contamination by organic chemicals, landfill leachates, gasoline and other materials have illustrated the precarious nature of this precious resource.

In response to these contamination incidents various state and federal agencies instituted regulations to prevent further contamination. These regulations focused on the prevention of further contamination from landfills, underground storage tanks and industrial waste dumps. Pesticides under these regulations were considered to be of concern only if there was a spill or other significantly large discharge.

Pesticides were once thought to only affect surface waters by the erosion of treated soil, spills or drift from applications. Groundwater was thought to be protected from contamination because of the intervening soil layer above the water table. The pesticides were either tightly bound to the soil or they degraded quickly in the environment.

In 1979 reports began to emerge from California and then New York which showed that certain pesticides were in fact reaching ground water in significant amounts. These findings initiated a reassessment of pesticide mobility and monitoring programs were initiated in agricultural areas.

Groundwater monitoring programs for pesticide contamination have generally been characterized by special studies of a limited scope. Directed sampling programs are limited in their scope and random sampling techniques are ineffective in discovering a contamination incident. This is a result of the difficulty of locating a small contamination plume contained in an otherwise undistinguished area. Thus, the contamination of an aquifer often goes unrecognized until a considerable portion of the aquifer is affected, yet a comprehensive sampling progam would be prohibitively expensive.

In Massachusetts nine pesticides have been found to date in groundwater by the Departments of Food and Agriculture and Environmental Quality Engineering. Nationally the Environmental Protection Agency has reported 17 pesticides related to agricultural use in groundwater. However, these findings do not fully describe the extent of groundwater contamination.

Reports of pesticide contamination from sampling programs have increased the awareness of the problem. Wells have been closed and as a result the public has demanded increased protection of this resource.

Protection of groundwater from contamination by pesticides can best be accomplished by the scientific identification and evaluation of which pesticides may leach, and the geographical areas most susceptible to contamination. Since restoration of an aquifer is difficult, if not prohibitively expensive, increased emphasis must be placed on prevention.

III. PROTECTION OF GROUNDWATER FROM PESTICIDES

There are many pesticide uses which have the potential to contaminate groundwater. However, most groundwater contamination reports have involved agricultural pesticides. For this reason, many state and federal efforts at identifying and preventing groundwater contamination by pesticides have focused on agricultural use. The Groundwater Protection Strategy is not an agricultural specific strategy and may affect a number of other pesticide uses such as turf and rights-of-way when groundwater risk is identified through the criteria in the strategy.

A major part of the protection for groundwater is the prevention of contamination. Groundwater protection proposals which prohibit or limit the use of all or most pesticides in certain areas are generally less than satisfactory for a number of reasons.

Research has demonstrated that not all pesticides have the same ability to leach. Certain pesticides are much more likely to leach while others should not reach groundwater except in the case of a spill, dumping or other similar activity. In addition, other factors have been shown to affect the ability of a pesticide to reach the groundwater. The hydrogeology of an area may favor or limit leaching and the type of agriculture or cultural practices may contribute to leaching.

The factors which determine overall leaching potential and levels of concern have been identified by the EPA and other groups which work with the environmental transport of pesticides. Therefore, prevention may best be accomplished by the scientific evaluation of the factors which determine contamination potential and their contribution to leaching. This strategy to protect groundwater from contamination is a three stage process consisting of Identification, Assessment and Response. First, the potential for groundwater contamination in areas of concern will be determined on an individual pesticide basis. Second, an assessment of the health hazards and magnitude of potential contamination is made. Finally, an appropriate control mechanism will be proposed to mitigate the problem.

A schematic of the strategy is outlined below with a more detailed explanation of the individual processes given within each section.

A. Identification

An assessment of the potential for leaching of a pesticide at any location must be based on a knowledge of the nature and properties of the pesticide, the quantity present and the mode of entry into the soil, the properties and conditions of the soil, and the climatic factors. The combination of these factors determines the processes and their interaction on the fate of the pesticide in a particular environment. Only when these factors are defined and characterized and the influence of the various processes evaluated can one make a reasonable assessment of the potential of a pesticide to enter groundwater at a particular locale.

Therefore, the first step in the Identification process is to identify the pesticides which have characteristics which indicate that they are susceptible to leaching. Second, identify the application factors which may contribute to pesticide leaching. Third, identify priority pesticide use areas and approximate the amount of use. Fourth, delineate the land areas susceptible to contamination because of geological conditions.

The use of computer models in identifying pesticides with high leaching potential under typical application conditions has emerged as a common method to predict leaching. Computer models will be discussed and evaluated to determine their usefulness in predicting transport to the groundwater.

1. Priority Pesticides

a. Physical and Chemical Characteristics

The physical and chemical characteristics of a pesticide are an important determinant of it's potential to leach. The EPA and others have identified these characteristics and outlined threshold values. In this section the characteristics of pesticides will be evaluated by the use of these threshold values and an assessment made of the leaching potential. Through this process pesticides with high leaching potential will be identified.

The physical and chemical characteristics identified by the EPA as indicators of potential detection in ground water are:

Chemical Property Factors

Water solubility-greater than approximately 30ppm.

K(d) (soil-water adsorption coefficient) - less than 5; usually less than 1 or 2.

K(oc) (K(d) divided by soil organic carbon content) - less than 300-500.

Vapor Pressure-not critical for volatile liquids that are soil injected.

Speciation - important if the pesticide is negatively charged at ambient pH.

Hydrolysis half life - greater than approximately 6 months.

Photolysis half life - greater than approximately 3 days.

Soil half life *- greater than approx. 2-3 weeks.

*An overall soil degradation rate, estimated as a composite rate for all the environmental degradation pathways, is commonly used as the measure of persistence.

Field data from monitoring programs, along with modeling of environmental fate and toxicological studies will be used to refine the identification of priority pesticides and sensitive areas of use.

b. Use Factors

Pesticide application factors have been shown to contribute to contamination. These factors have been identified as contributors to contamination potential because they facilitate or accentuate the ability of pesticides to move through the soil profile to the groundwater. It should be noted that these factors do not generally cause groundwater contamination unless there are additional factors present.

The use factors of concern are identified below with a brief explanation of the importance and contribution of the factor to overall contamination potential.

(1) Soil incorporated or injected pesticides.

Soil incorporated materials have an increased potential for groundwater contamination due to the placing of the material directly into the soil. This precludes or limits several mitigating mechanisms including: photodegradation, lowered adsorption to organic matter in the topsoil, and places the material in the cooler zones of the soil where degradation rates are much lower.

(2) Pesticides used at high rates (>2 lb/acre A.I.) or frequent application intervals.

Materials used at high concentrations have a lowered attenuation rate in the topsoil due to the saturation of adsorption sites in the soil. Furthermore, soil residue buildup has been reported from frequent applications and incomplete degradation of previous applications.

(3) Pesticides typically applied at preemergence or preplant.

Use early in spring, before the occurrence of large amounts of precipitation and low soil temperatures limit the amount of degradation possible by soil microorganisms. Moreover, the lack of plant material eliminates this as an important "sink" for pesticides. Additionally, plant root systems harbor important microbial populations which are active in pesticide degradation.

(4) Large areas of cropland treated.

Geographical areas with a large percentage of the land areas treated with pesticides have a higher probability of contamination. This is particularly important when these land areas are treated with priority pesticides or in hydrogeologic sensitive areas.

One factor which must also be considered in the evaluation of leaching potential is the effect of evapotranspiration on pesticide transport. Evapotranspiration is the upward movement of moisture and solutes through the soil profile. In Massachusetts there is a negative water balance in the summer months which may limit the mobility of certain pesticides. Pesticides applied early in the spring or late in the fall will be affected less by evapotranspiration.

c. Computer Models

Since assessment of leaching potential requires knowledge of the likelihood of a pesticide to leach under a set of environmental conditions at each locale, the task for such an assessment may appear too monumental, if not impossible, to accomplish. One approach which scientists have attempted to use to over come the difficulties is to develop simulation models which would make reasonable estimates of the fate of a pesticide in a particular environment under a set of environmental conditions.

The validity and usefulness of the model will depend upon how well the pesticide, soil, and climatic parameters are characterized. The parameters may be changed to represent several environmental conditions and thereby simulate the application of pesticides under different conditions.

A useful model will incorporate all the important factors and relationships to represent the system being studied. There are a number of models (i.e. PRZM, LEACH, GLEAMS) which represent the important factors in their calculations; however, these models are limited in their abilities. These limitations are due to the number of variables which must be estimated or idealized within the model calculations.

Models, therefore, cannot be used as an absolute indicator of potential leaching since various sections of the models are idealized and do not reflect actual field conditions. Models will be used as a screening technique to identify pesticides which may need further investigation and to direct the most effective use of monitoring efforts.

Field studies, conducted by the registrants, are generating data that can be used to validate or "fine tune" existing models to better predict pesticide movement under various environmental conditions. When properly calibrated, a model can simulate the transport and degradation of pesticides in the soil profile and estimate the amount of residue which will reach groundwater before they are degraded. These models will be utilized by the Department to estimate pesticide leaching potential.

2. Identifying Pesticide Use

a. Land Mapping

Land use information is an essential part of an accurate assessment of groundwater contamination potential. Land areas which routinely receive pesticide applications must be identified such as agricultural land, Rights-of-Way and golf courses. These application sites or land uses generally define areas which use certain groups or types of pesticides. For example, in Rights-of-Way pesticide applications, herbicides are almost exclusively used. It is also known that there are a limited number of herbicides used in the control of vegetation and certain pesticides are more commonly used than others. Consequently, when a ROW is identified, a certain group of pesticides is associated with that use. If there are priority pesticides in that pesticide group then the land areas will require additional review and assessment.

Agricultural land use information is particularly important because areas with large agricultural density pose a higher risk to groundwater due to the intensity of pesticide use. However, because different crops use different groups of pesticides each crop may be considered as a different land use. Furthermore, most crops have a recommended list of pesticides for use in controlling pests which has been developed by the Cooperative Extension Service. These lists may be used in identifying land and/or crop uses for further review. In particular, certain crops characteristically use pesticides which have been identified as priority pesticides, and therefore require additional evaluation.

b. Pesticides Use and Distribution Data

Identifying land areas which receive pesticide applications with recommended pesticide use information will permit an approximate assessment of contamination potential. However, actual use information of the pesticides and rates of application to those lands is required for an accurate assessment of contamination potential. Consequently, pesticide use and distribution data must be combined with land use data to identify areas of high priority pesticide use.

Pesticide dealers are required to keep sales records of restricted use pesticide sales and to submit those records to the Department on an annual basis identifying the pesticide, amount sold and the purchaser. Since most priority pesticides are now classified as restricted use, distribution data is available to evaluate the amount of priority pesticides sold.

Private and commercial applicators are required to keep records of the pesticides and amounts used either in the production of a commodity or for hire on the property of others. As with pesticide dealers, the Department has the authority to have annual use records submitted. Specific use records are essential to identify the use of pesticides which may pose a risk to groundwater. The Department is preparing a program to obtain use records from the 6000 pesticide applicators in Massachusetts.

3. Hydrogeologic Sensitive Areas

Pesticide groundwater contamination is not solely dependent upon the chemical properties and the amount of pesticide use, but also on the ability of the pesticides to percolate through the soil profile to the water table. The rate of pesticide leaching is determined by amount of precipitation, providing the transport mechanism, and by the soil and geological characteristics which serve to either impede or facilitate the movement of the materials. Therefore, areas of similar pesticide use will have different potentials for contamination because of their hydrogeologic setting.

The factors which typically characterize an area susceptible to potential leaching include: 1) the general topography and climate of the area. 2) the nature and depth of the surface soils, root zone subsoils, and confining layers. 3) the depth, use and character of area ground water. 4) prevalent irrigation practices.

A methodology to evaluate contamination potential of hydrogeologic settings, called DRASTIC, has been developed for the EPA. The ranking system designates certain characteristics which determine vulnerability and produces a numerical index which helps prioritize areas with respect to pollution potential. Some of the DRASTIC factors are listed below with assessment criteria:

> High soil permeability-greater than 2.0 in/hr infiltration rate; gravel, sand, loamy sands, and sandy loams; typical field capacity<10%.
>
> Low Organic matter - < 2% in topsoil (a horizon)
>
> High water table - <50 ft. below soil surface; usually less than 30 ft.
>
> No confining layer above water table.
>
> High recharge rate - rainfall or irrigation
>
> Low soil temperature in the unsaturated zone

Soil pH-importance dependent on pesticide

Level topography-little or no slope to land surface.

The DRASTIC ranking system to prioritize sensitive zones will be utilized in the identification, but will probably be limited to a high, medium or low classification because of localized conditions which make further division difficult.

The lands surrounding public water supplies, zones I and II, will also need to be identified due to their increased sensitivity from recharge and because of the health concerns for the people which are served by those wells. When the zone II is not delineated, it shall be designated as one half mile radius around the well.

B. Assessment

Pesticides which are identified as priority materials will require an assessment of the potential risk to the groundwater and to the public. Assessments will consist of toxicological evaluation of a pesticide and depending on the presence or prediction of contamination either an environmental fate study or, a directed monitoring program to define the magnitude of the contamination.

1. Toxicological Review

The prime consideration of this strategy is the protection of groundwater from pesticide contamination in order to prevent health hazards from public exposure. Pesticides which are carcinogenic or have high acute toxicities are of increased concern even when low concentrations are predicted. Therefore, a complete health risk assessment of each pesticide which has the potential to reach groundwater is essential.

Health risk assessments will be completed and guidelines set before monitoring programs are undertaken. Guidelines or Health Advisory Levels are necessary so that accurate decisions can be made regarding the health risks presented to the public if pesticides are found in groundwater.

The need for a set of guidelines is being addressed by the EPA Office of Drinking Water. When federal guidelines are not available, assessments and guidelines will be requested of DEQE and the DPH for the Commonwealth.

Guidelines will be set on a priority basis by having the health risk assessment of the priority pesticides done first. Guidelines will be set for the most hazardous pesticides on a priority basis. The assessment should also consider alternative sources of exposure of the same chemical (e.g. through food intake or other pesticide uses), and possible synergistic effects from exposure to multiple contaminants.

2. Environmental Fate Studies

The unsaturated zone between the ground surface and the water table is where most of the pesticide transformation occurs and is characterized by a complex interaction of transport factors. Laboratory and model predictions do not adequately describe the transport mechanisms found in the field. Consequently, environmental fate studies are the best method to predict leaching potential under varying field conditions.

Following the identification of possible groundwater contamination from a pesticide, an environmental fate study may be conducted to characterize the mobility. These studies observe the degradation and the transport, of the pesticide in question, in the soil profile. A scientific analysis of the results of these studies may then be used to assess the leaching potential under a variety of environmental conditions.

In the light of the number of pesticides which have been found in groundwater which have not been predicted to leach, a field study conducted by the registrant may be considered as a requirement for re-registration whenever the question of leaching potential arises. Field studies should be performed in Massachusetts or in conditions similar to Massachusetts since it has been shown that studies conducted in other states are not directly transferable to all areas.

3. Monitoring

Groundwater monitoring is used to assess the presence and extent of contamination. Previous monitoring programs have targeted chemicals with demonstrated crop use and contamination histories. These programs have been characterized by their limited scope and do not fully describe the extent of ground water contamination. However, due to the high cost of monitoring, wide scale sampling programs are unfeasible. Therefore, groundwater monitoring efforts will target high priority pesticides and specific sensitive areas of the state based upon the prioritization scheme outlined in the Identification section. A monitoring program may be instituted if leaching potential assessment indicates a high probability of significant residues in groundwater or from reports of contamination elsewhere.

This groundwater protection plan is based on the prevention of future contamination incidents by instituting preventative or mitigating measures before contamination occurs. Therefore in the future, certain monitoring efforts will be directed to assessing the effectiveness of those measures.

C. Response

When a pesticide is detected in groundwater, or is predicted through the priority setting system and/or environmental fate studies, it must be determined how available laws, regulations, and other control mechanisms may be used to address the problem. The type of response may be divided into two major categories, Regulatory and Non-Regulatory controls. The response proposed is dependent on the health risk of public exposure and the effectiveness of prevention measures. The detection of pesticides which have significant health risks will generally be addressed by regulatory means.

1. Regulatory Controls

Regulatory action can be carried out by affecting the pesticide product registration and/or through the promulgation of regulations. Actions directed towards specific chemicals may be accomplished through product registrations, where as, broad sweeping actions to protect a resource can best be accomplished, through the promulgation of regulations within the mandates stated for the Department of Food and Agriculture. The regulatory response will vary depending on the hazard presented to the public and/or environment from exposure.

The Pesticide Board Subcommittee has the responsibility for pesticide product registration in the Commonwealth of Massachusetts. Therefore, the following regulatory controls are available from the regulatory authority of the Subcommittee under M.G.L. Ch. 132(b) and regulation promulgated there to, 333 CMR. Available options include:

a. Suspension - immediate temporary discontinuation of use when continued use poses an imminent health hazard.

b. Revocation - discontinuation of registration when continued use poses a serious health risk.

c. State Limited Use - Certification required and permit necessary before pesticide may be applied. Health hazard may exist but no acceptable alternative available. Sensitive areas may be identified and specific pesticides applied only with permit.

d. Restricted Use - use limited to certified applicators, special training may be required.

e. Label Change - potential problem; mitigation by geographic limitations, advisory and cautionary statements, restrictions in areas prone to groundwater contamination.

Regulatory control responses have been used to mitigate potential contamination of groundwater. In April of 1986, a group of pesticides had their registration status amended to restricted use classification because of their ability to leach to groundwater.

The protection of groundwater is the prime concern of this strategy, but more important is the protection of our sources of drinking water. A mechanism which will be used to protect groundwater is the expansion of the State Limited Use (SLU) category to include a provision for Drinking Water Protection (DWP). This restriction of the registration is an extension and refinement of the EPA's Agricultural Chemicals in Ground Water strategy. This classification will allow the continued registration of pesticides with contamination potential by permitting its use only in areas which are not susceptible to contamination.

To protect public well water supplies all zone II areas of public wells, as defined by the Department of Environmental Quality Engineering, would be designated as a sensitive area. This would require that any pesticide designated State Limited Use (SLU-DWP) would require a permit from the Department to be used on those lands. The criteria for a permit evaluation may include: the pesticide characteristics, soil type and rates of application.

Private water supplies would be protected by designating all Class I waters, as defined by DEQE, as sensitive areas. Municipalities would be able to designate additional sensitive areas by identifying those areas to the Department and requesting a sensitive zone designation.

The Department can promulgate regulations with approval of the Pesticide Board. Through regulations, the Department can prohibit the use of pesticides within certain sensitive areas as a prophylactic measure. An example of regulations intended to protect resources is the proposed Rights of Way Management Regulations which will establish buffer zones surrounding sensitive groundwater areas and restrict the use of certain chemicals within these areas.

2. Non-Regulatory

a. Integrated Pest Management

An alternative prevention strategy is the development and implementation of Integrated Pest Management Programs (IPM). IPM programs have the potential to eliminate or drastically reduce pesticide use and thereby prevent groundwater contamination.

Integrated Pest Management is the selection, integration, and implementation of pest control strategies based on predicted economic, ecological, and sociological consequences. IPM seeks maximum use of naturally occurring pest controls, including weather, disease agents, predators, and parasites. Before any control measures are used, the ecological, sociological and economic costs have to be considered. Pesticide applications are used only as required to keep a pest from surpassing intolerable levels predetermined from assessments of the potential for damage. A well managed IPM system has the potential to significantly reduce pesticide applications, and thereby limit or diminish contamination. A future consideration of IPM programs may include the incorporation of environmental fate factors into the IPM equation to further limit the impact of pesticides on the environment.

The Massachusetts Cooperative Extension Service in conjunction with the Department of Food and Agriculture has implemented different IPM programs for several major crops grown in the state. Additional programs are currently under development for other commodities.

b. Education and Training

One area which a significant potential to both reduce pesticide use and groundwater contamination incidents is to further educate the pesticide applicator. In the past most education was directed to the safe application of pesticides with regard to public and applicator safety from handling, drift, posting areas, etc.

Education could also instruct pesticide applicators in the factors which may cause groundwater contamination and thereby make them more aware of the problem. Many pesticide labels now warn the user of the possibility of groundwater contamination from pesticide use, but the pesticide user is not instructed in ways to minimize the threat to groundwater. Training sessions in various areas of pesticide application (e.g. calibration, use of equipment, identification of pests, etc.) may reduce the amounts of pesticides used. However, increased efforts must be directed to educating the applicator in ways to reduce the potential for contamination.

Education should focus on 1) minimizing pesticide application rates, whenever possible, to the levels required to control the pest infestation 2) identify contributing application factors and alternative use practices which may be used 3) identifications of soils and conditions susceptible to contamination and modifications in pesticide applications to minimize impacts or changes in crops.

IV. GROUNDWATER PROTECTION ACTION PLAN

This strategy represents a major step towards preventing groundwater contamination from pesticides in Massachusetts. Several sections of the strategy have already been implemented by the Department while others will be implemented over the next few years. The main tasks required for the strategy are outlined below:

A. The Department will:

1. Generate a list of priority pesticides based upon:

a. physical and chemical characteristics
b. use practices
c. computer models

2. Identify high pesticide use areas by:

a. agricultural and other land use mapping
b. pesticide use and distribution data

3. Identify geologically sensitive areas

B. Comprehensive assessment of priority pesticides will be made to determine:

1. Toxicological significance of public exposure

2. Potential contamination from field studies

3. Magnitude of contamination from monitoring studies

C. Initiate response to mitigate documented or potential contamination by:

1. Regulatory action

a. Expand State Limited Use category to include Drinking Water Protection (DWP) designation.

b. Initiate appropriate registration action (i.e. suspension, revocation, restriction) through the Subcommittee on an as needed basis.

2. Nonregulatory mechanisms

a. Develop and implement IPM technology for all major crops
b. Increase applicator training and public education

D. Future Issues

The protection strategy presented here is a step forward in preventing groundwater contamination from pesticides in the Commonwealth. This strategy, however, represents only the first step which must be taken to prevent contamination. In order for groundwater in Massachusetts to be truly protected several additional tasks and issues must be addressed. These issues include:

- Determine relationship between pesticide regulations and water programs.

- Support implementation of groundwater classification in order to identify potential water supplies.

- Implement program currently under evaluation to assist farmers in disposing of existing pesticide waste.

- Support legislation requiring a collection system for pesticide containers.

- Develop the Storage and Disposal component of the Ground Water Protection Strategy.

d. Cape Cod Sole-Source Aquifer Protection

The Cape Cod Aquifer Management Project (CCAMP) has completed several reports on the Cape Cod sole-source aquifer. The reports were developed by the CCAMP participating agencies, namely the Massachusetts DEQE, the U.S. EPA, the Cape Cod Planning and Economic Development Commission (CCPEDC) and the U.S. Geological Survey (USGS).

The project was initiated in 1985 with the goal of studying existing federal, state, and local programs for protecting and preserving Cape Cod's sole-source aquifer. The DEQE, EPA, CCPEDC and USGS initiated a two-year study to determine the adequacy of current groundwater protection programs and to recommend improvements. The study was comprehensive and covered landfills, discharge permits, water supply planning, underground storage tanks, septage management, hazardous materials use and disposal, private well protection and pesticide recommendations. The project included institutional recommendations for implementing strategies to address each of the above issues. The general thrust of each strategy is to maximize state and federal assistance to allow realization and implementation of local initiatives to protect groundwater resources.

The Nonpoint Source Management Plan supports the Cape Cod Aquifer Management Project (CCAMP) and endorses its approach and recommendations. The DEQE Office of Special Projects has taken a pro-active position for implementation of the recommendations made by the CCAMP study. The overall project is managed by a Steering Committee with representation from DEQE, CCPEDC, EPA and the USGS. The DEQE is acting as project coordinator. The Nonpoint Source Program will provide technical assistance to the CCAMP project through participation on the Groundwater Protection Committee of the Special Projects Office (DEQE).

5. Metropolitan Boston Water Supply Watershed Protection Plan

Metropolitan Boston receives its drinking water from a complex system of reservoirs whose parts include the Quabbin Reservoir, the Ware River, the Wachusett Reservoir and the Sudbury Reservoirs. This system services 46 towns and cities and some 2.4 million people. The watershed is about 333,000 acres (515.6 square miles) for the Quabbin and Wachusett Reservoirs and the estimated safe yield is 330 million gallons per day. Historically this water supply system was managed by the Metropolitan District Commission (MDC). Chapter 372 of the Acts of 1984 changed some of the agency's authority and created a new authority - the Massachusetts Water Resources Authority. The new Watershed Management Division of the MDC is given the responsibility of managing the surface water supplies. The above noted Chapter 372 included some direction for the Watershed Management Division which stated that "at least every five years adopt one or more periodic watershed plans...that will include forestry, water-yield enhancement and recreation." It is curious to note that water quantity is mentioned but not water quality. Certain parts of a watershed plan (e.g., forestry management) have been crafted but to-date a cohesive, comprehensive plan is lacking.

There is another issue looming on the horizon for the Quabbin - Wachusett system which seems to support the need for a solid nonpoint source management plan for the watershed. This is the issue of a water filtration plant and the Safe Drinking Water Act, as amended through 1986. Part of the Act directs that if a public water supply is not filtered then the EPA will enforce certain stringent conditions relative to watershed control. The EPA will mandate compliance with strict criteria at the source for turbidity, giardia, coliform, certain viruses, disinfection efficiency and other parameters. If these conditions cannot be reasonably complied with then the Water Resources Authority may be faced with an expensive decision on a water filtration plant.

The issue of watershed protection for the Boston metropolitan area water supply has recently been highlighted by the filing of legislation for the 1988 legislative season. The pertinent part of the proposed bill is as follows:

"Notwithstanding the provisions of any general or special law to the contrary, the following shall be prohibited within the portion of the active water supply source that lies within four hundred feet of the river or reservoir or their tributaries, or lies within one hundred feet of the one hundred year flood plain, or is on an aquifer that would have a well yield of over 100 gallons per minute:

the disposal of wastewater from either private or municipally owned sewage treatment facilities; the on-site disposal of wastewater which exceeds four hundred gallons per unit per day per acre the disposal of wastewater within four hundred feet of public water reservoir and tributaries thereto; the placement of the leaching field of a subsurface waste water disposal system less than four feet above the maximum water table level; storage of liquid petroleum products of any kind except in a free standing container within a building for the heating of that building; the disposal and storage of hazardous materials and waste as defined in Chapter 21C of the General Laws; the disposal of solid wastes other than compostable materials or stumps; the storage of road salt or other deicing chemical; the outdoor storage of fertilizers, herbicides, and pesticides and the outdoor uncovered storage of manure; animal feedlots; boat and motor vehicle service, washing and repair establishments; junk and salvage yards; the rendering impervious of more than 10% or two thousand and five hundred square feet, of any lot whichever is greater; the excavation of gravel and sand except that incidental to the construction of permitted structures; and the direct discharge of runoff from roads and parking lots into, or within one hundred feet of surface waters; any other activity which could degrade the quality of active water supply sources.

Any person who wishes to excavate any sand and gravel within the area specified in the above paragraph or engage in any of the prohibited activities cited in the above paragraph shall notify the division of environmental quality engineering thirty days before the work is to begin.

The Department of Environmental Quality Engineering shall make rules and regulations for the sanitary protection of the active water supply sources and may enter into interagency agreements with the Division of Watershed Management regarding the enforcement of this chapter.

This section shall apply to all land within the active water supply sources except for lands with preexisting uses and uses for which all applicable municipal, state and federal permits and approvals have been obtained as of the date of the passage of this act."

The proposed legislation has met with strong local opposition as being too stringent and paramount to "land taking" without compensation. It does show, however, that there is a real concern for protecting the water supply and that the legislative route is being considered to implement such protection.

As a first step, the Watershed Management Division, Environmental Quality Section of the MDC must develop and implement a watershed management plan which minimally encompasses the Quabbin and Wachusett watershed areas. As part of the long-term strategy of the nonpoint source management plan the DWPC will assist in the process, especially as it relates to nonpoint source problems and best management practices. The DWPC will work with the Environmental Quality Section of the Watershed Management Division to produce a viable and meaningful watershed protection plan. The DWPC will be able to lend water quality monitoring and assessment support as part of the plan. The watershed plan can be expanded to include the Wachusett Reservoir. In this regard the Nashua River Watershed Association has outlined a watershed management plan for the Stillwater River which is tributary to the Wachusett Reservoir. This plan is ready for implementation once a funding source can be identified.

As a second step, the Watershed Management Division of the MDC must implement, enforce and monitor the watershed protection plan. The DWPC will assist as appropriate, especially in the area of water quality monitoring.

A third step will focus on legislative initiatives to protect the water supply. There must be good communication between the legislature and those entities charged with managing and protecting the water supply. To this end it will be part of the plan to conduct an informational forum between concerned legislators, the nonpoint source advisory committee, the Watershed Management Division (MDC), and the DEQE legislative affairs office. The purpose of such a forum will be to ensure that a balanced approach is taken in addressing the watershed protection and that best management practices are adopted in a fair and equitable manner to all public and private parties.

6. Assessment Report Update and Expansion

As part of the long-term strategy of the nonpoint source management plan the DWPC shall continue to assess the waters of the Commonwealth for nonpoint source pollution problems. This effort will be to update current information as well as to expand the current database.

This strategy will focus on the following areas:

a. To include nonpoint source assessment sampling with the normal annual water quality surveys of the Technical Services Branch of the DWPC. These surveys traditionally include lakes and mainstems and major tributaries of the state's watersheds as well as coastal waters. Emphasis will be placed on gathering groundwater data from each watershed survey.

b. To begin assessing the state's wetlands for nonpoint source water quality problems and basic water quality data. The Division of Wetlands will be asked to prioritize wetland areas for water quality assessment. Such priorities may come from each of the five DEQE regions. Major development projects with potential wetland impacts will be considered as priority projects as the situation arises.

c. To enter the nonpoint source data into the Geographic Information System at the TSB of the DWPC. The nonpoint source data can be entered on a watershed basis along with any other available information. The type of equipment currently housed at the TSB is the so-called PC - ARC/INFO systems. Information will be entered as overlays and can be printed out with any other set or subset of data desired. The nonpoint source program will provide resources to digitize the overlay maps and enter the attribute data, provided that such resources are available. The information and map overlays would be made available to all interested agencies. This work will be coordinated with DWS which has tremendous overlay information.

7. State Nonpoint Source Program Establishment

In 1987 and again in 1988 legislation has been filed to create a state nonpoint source pollution control program. A copy of the proposed legislation is attached as Appendix S. The proposed nonpoint source pollution control program would provide grants to most public entities to conduct diagnostic/feasibility studies and implementation projects for the prevention, control and abatement of nonpoint source pollution which causes degradation of the water quality of the waters of the Commonwealth. Funding would be a total of $50 million over ten years. Projects would have to be prioritized based upon water quality data, use or potential use as a potable water supply, recreational use, economic importance and other relevant factors.

The EOEA, DEQE and DWPC strongly support this legislation and will work toward its adoption. The proposed bill would allow the state to match any available federal funds from Section 319 of the Clean Water Act. The proposed program can also fund projects in the absence of federal funds.

In either case, the eligible grantee must provide certain matching funds.

Just as the Massachusetts Clean Lakes Program has provided tremendous impetus and direction to protecting and restoring the states publicly owned lakes, it is hoped the proposed nonpoint source pollution control program will lead the way in correcting the nonpoint source problems in the rivers, streams, coastal waters and groundwaters.

IV. FUNDING SOURCES

INTRODUCTION

Money, of course, is the bottom line for any program. The nonpoint source management plan contained herein is ambitious and wide-ranging in terms of its scope of application. The various implementation strategies call upon many different agencies to pull together and coordinate their efforts to address nonpoint source problems. The limiting factor in most cases, however, is lack of adequate personnel to carry out the plan. The federal government itself is either level funding or reducing environmental programs as part of the federal deficit reduction plan. Section 319(h) or (i) did not receive appropriations in FY 1988 and will probably not receive any FY 1989 funding. The federal Clean Lakes Program (Section 314) was not funded in FY 1988 and the 106 program was level funded. Despite public support for such environmental funding, the near future for federal funding to implement aspects of this nonpoint source management plan do not appear favorable. In most cases, funding sources will likely have to derive from the state.

STATE REVOLVING FUND

There is one area, however, of partial federal funding that does hold promise for implementation of the nonpoint source management plan. Under the 1987 amendments to the Clean Water Act (P.L. 100-4) there was created a new Title VI: State Water Pollution Control Revolving Funds. The purpose of the revolving fund is to eventually replace Title II; the construction grants program. The revolving fund may provide assistance (1) for construction of treatment works...which are publicly owned, (2) for implementing a management program under section 319, and (3) for developing and implementing a conservation and management plan under Section 320 (Clean Water Act, Section 601 (a)).

Legislation has been submitted for the 1988 session to establish a state revolving loan. Administrative policy regarding priority funding of projects has not been set forth as of this writing.

The DEQE recognizes the importance of addressing nonpoint sources of water pollution in order to meet water quality standards. The state revolving fund would provide a viable, long-term source of funding to implement aspects of the management plan. Certain commitments, however, must be met in complying with the construction grants schedule of building or upgrading publicly-owned treatment works. The overall strategy for use of the state revolving fund shall incorporate a component devoted to implementing priority aspects of the nonpoint source management plan if the Commonwealth decides to pursue the program along the lines outlined by the Federal Clean Water Act. Since the specific's of this strategy have not yet been decided at this time, they cannot be set forth here.

STATE NONPOINT SOURCE PROGRAM (PROPOSED)

As described under long-term strategy number 7, there is an ongoing attempt to establish a state nonpoint source control program (see Appendix 0). Submitted to the legislature in 1987 and again in 1988, the proposed bill would provide $50 million over ten years to fund diagnostic/feasibility studies and implementation projects. The bill has wide-range support among environmental groups and environmental state agencies. The EOEA, DEQE and DWPC all actively support the proposed legislation and will work for its enactment.

STATE CLEAN LAKES PROGRAM

Established by Chapter 628 of the Acts of 1981, as amended, the Clean Lakes Program provides up to $4 million per year to fund diagnostic/feasibility studies and preservation or restoration projects. The Clean Lakes Program may be considered a publicly-owned lake and pond nonpoint source control implementation program. Most all of the 24 preservation or restoration projects funded under the program address nonpoint sources of water pollution. Point source problems affecting lakes or ponds must first be addressed under other applicable program before being considered by the Clean Lakes Program.

Solutions to the nonpoint sources of pollution impacting the lakes and ponds run the range of best management practices to control nutrients, soil erosion and sedimentation, agricultural pollutants, urban runoff, septic systems, bottom sediments and others.

The Clean Lakes Program has funded (up to 1988) a total of 152 projects for a total cost of $25,729,100. Of this total cost the state contributed $16,161,717 and the local share was $7,593,249. In terms of types of projects funded, the breakdown is as follows:

	D/F Studies	Implementation Projects	Maintenance Project
No. Projects	85	53	14
Total Cost	$5,519,676	$19,773,224	$436,200
State Cost	$3,878,065	$11,966,502	$317,150
Local Cost	$1,621,702	$ 5,852,496	$119,050
Federal/Other Cost	$ 19,909	$ 1,954,226	

STORMWATER RUNOFF

The massive transportation bond bill (Chapter 15 of The Acts of 1988) that recently passed the legislature contained some specific and general nonpoint source control measures dealing with stormwater runoff.

One project was for $20 million to protect the Cambridge Reservoir from stormwater runoff. The specific language was as follows:

Section 2(a)...
"provided, however, that a sum not to exceed twenty million dollars of the authorization contained in this paragraph shall be expended for the purpose of treating or eliminating the discharge of highway drainage under the control of the department into the Hobbs Brook and Stony Brook reservoirs or onto any land area within five hundred feet thereof. The department shall submit to the house and senate committees on ways and means and the joint committee on natural resources and agriculture plans to implement this project, based upon an analysis of all practical drainage alternatives and treatment techniques by December thirty-first, nineteen hundred and eighty-eight;"

A stormwater runoff grant program was also contained in the transportation bill:

Section 3(q):
"(q) a sum not to exceed five million dollars for the department to establish a program to provide grant funds to cities and towns for projects to construct,

reconstruct, and otherwise improve water supply, drainage, or sewerage facilities along roads, highways, and bridges within the commonwealth. Said grant shall be used to alleviate inadequacies, deficiencies and pollutants in public water supply systems and coastal waters caused by stormwater runoff. The commissioner of said department shall establish rules and regulations to govern the application process and disbursement of grant funds under the provisions of this section;"

The DWPC shall attempt to work with the Department of Public Works as a nonpoint source advisor for project funding. It is hoped that the program described above will integrate with the nonpoint source management plan. Perhaps the mention of "coastal waters" will mean that best management practices can be implemented in an area of closed shellfish beds impacted by stormwater or urban runoff.

Other nonpoint source control provisions of the transportation bill include:

- $5 million made available to cities and towns for the construction of salt storage sheds. Section 3(a).
- $6 million made available, in part, for construction of salt storage sheds at DPW district offices where salt for state roads is stored Section 3(a).

Efforts will also be made to investigate whether the DPW will cooperatively fund the short-term strategy for road-deicing chemicals.

In terms of funding sources to implement each of the short and long-term strategies the following outline may be used as a guide. It should be noted that use of any federal Clean Water Act funds for implementation purposes requires a 40 percent state match.

MANAGEMENT PLAN STRATEGY	FUNDING SOURCE	
SHORT-TERM		
Silviculture	205(j) (5)	
	DWPC, R&D funds	$ 56,761
	Univ. MASS	$ 22,000
	MDC	$ 13,500
Agriculture	205(j) (5)	
	State Revolving Fund	
Construction	205(j) (5)	
	State Revolving Fund	
Urban Runoff	205(j) (5)	
	State Revolving Fund	
	DWPC, R&D	$130,000
	Buzzards Bay Program (EPA)	$400,000
	plus 25% match @/yr.	

MANAGEMENT PLAN STRATEGY SHORT-TERM	FUNDING SOURCE	
	Buttermilk Bay (EPA)	$300,000
	North River Nonpoint Source Project	$ 35,000
Resource Extraction	205(j) (5) State Revolving Fund Div. of Water Supply (DEQE) Audubon Society	
Land Disposal	205(j) (5) Div. Solid Waste (DEQE) as provided by Solid Waste Act of 1987 State Revolving Fund Div. Hazardous Waste	
Hydrologic/Habitat Modification	205(j) (5)	
Underground Storage Tanks	205(j) (5) Conserv. Law Foundation Audubon Society	
Road Deicing Chemicals	205(j) (5) Div. Water Supply (DEQE) DPW Audubon Society	
Targeted Watershed/Projects	State Nonpoint Source Program (submitted legislation)	$50 M
MANAGEMENT PLAN STRATEGY LONG-TERM		
Revise Title 5	DEQE in-house	
Soil/Sedimentation Law	None needed initially. If successful then 205(j) (5) or State Revolving Fund	
Stormwater Runoff Controls		
a. subdivision control law	none needed	
b. Chapter 90 local roads	205(j) (5); State Revolving Fund	
c. state, county, federal roads	DWPC, DPW, EOTC	
Groundwater Protection		
a. well head protection	205(j) (5) State Revolving Fund	
b. groundwater permit program	DWPC	

MANAGEMENT PLAN STRATEGY LONG-TERM	FUNDING SOURCE
Metro Boston Water Supply Protection	205(j) (5) MDC
Assessment Report Update/Expansion	205(j) (5)* DWPC
State NPS Program	None Needed

*NOTE: 205(J) (5) indicates use of current program personnel supported by 205(j)(5) or funds from that source to be used to support educational, technical assistance, training, etc. activities. Other funding sources identified shall be in the form of staff hours of current personnel assigned to that agency or entity or general program funds that may be used to support educational activities, technical transfer, training, assessments, etc.

The use of the state revolving fund for implementation activities has not yet been completely finalized or decided as of this writing.

OTHER FUNDING SOURCES

There are other state programs which provide grant funds for purposes that may be construed as nonpoint source pollution prevention or groundwater protection. These programs were previously described in the Assessment Report under "Nonpoint Source Management in Massachusetts - An Overview," (page A-IV-9).

Several of these programs received funding recently with the passage of the so-called open space bill, otherwise known as an act providing for an environmental enhancement and protection program for the Commonwealth, Chapter 564 of The Acts of 1987. Some of the programs and their respective funding levels contained in that law are as follows: (For an overview of these programs see Assessment Report, page A-IV-9):

- for the acquisition of property, easements, rights in development and associated costs on properties within the Quabbin, Ware River, Wachusett andSudbury watersheds for the protection of the water resources. By the Division of Fisheries and Wildlife under their Land Acquisition Program. $30 million.

- for the Massachusetts Self-Help Program, grants to cities and towns to acquire conservation land. $25 million.

- for the acquisition of lands fronting on rivers and for the design and construction of recreational facilities, including costs for conservation and recreation purposes. By the Department of Environmental Management under the under the Scenic Rivers Program. $28,500,000.

- for the acquisition of land and easements in land fronting saltwater for the purpose of continuing a long-term program of providing and ensuring conservation of and public access to saltwater front properties. Under the Department of Environmental Management. $40 million.

- for the acquisition of lands and waters and easements to protect and conserve groundwater acquifers and recharge areas, surface water supplies and watershed areas. By the DEQE under the Aquifer Land Acquisition Program. $15 million.

- for the acquisition of lands and associated costs for: (a) lands fronting on rivers and streams, including cold water streams; (b) wildlife lands and corridors; (c) land adjacent to conservation lands; and (d) lands identified as rare and endangered (animal or plant) species habitat provided, however, that not less than twenty percent of the funds shall be expended on properties within the coastal zone as defined by the Massachusetts Office of Coastal Zone Management, including coastal anadromous streams. By the Division of Fisheries and Wildlife. $30 million.

- for a program to acquire agriculture preservation restrictions. By the Department of Food and agriculture under the Agriculture Preservation and Restriction Program. $35 million.

- for land acquisition and related improvements on properties within the metropolitan park district, and, land in and around rivers, streams, ponds and marshes, including Constitution beach in the East Boston section of the city of Boston, within the jurisdiction of the metropolitan district commission to provide or enhance public access to or enjoyment of such rivers, streams, ponds and marshes. And to carry out site clearance including demolition of structures, and preparation, relocation, reclamation and development which is necessary and appropriate to restore and improve the natural setting of said land, rivers, streams, ponds and marshes and improve the water quality thereof. Under the Metropolitan District Commission. $48 million.

The legislature also recognized a need to institute a statewide planning and land management capability in order to coordinate these various land acquisition programs. In so doing the legislature included the following section in the so-called Open Space Bill:

SECTION 10. The secretary of environmental affairs is hereby authorized to expend a sum not exceeding five hundred thousand dollars for the development of statewide planning and land management capabilities and to facilitatecoordination of the various land acquisition and development programs under the jurisdiction of the executive office, including but not limited to programs initiated by the departments of environmental management, food and agriculture, environmental quality engineering, fisheries, wildlife and environmental law enforcement, and the metropolitan district commission; and for the preparation of a report detailing all land owned by the state and managed by the executive office of environmental affairs or its constituent agencies and the purposes used therefor, said report to be filed with the clerk of the house of representatives who shall forward the same to the joint committee on natural resources and the house and senate committees on ways and means by February first, nineteen hundred and eighty-eight and updated periodically thereafter; and for the study of the need for a program to protect lands around drinking water reservoirs.

Despite the noted filing date of February 1, 1988 for the above described report, this task has not been completed because none of the authorized funds have yet been released. The Nonpoint Source Program will benefit from this task by being able to include the land acquisition data into the GIS assessment maps described earlier in this plan under III.C.6. The Nonpoint Source Program will coordinate with the EOEA in the preparation of the report as well as the study of the need for a program to protect lands around drinking water reservoirs. This latter study will also involve the DWS.

V. MILESTONE SCHEDULE

In accordance with Section 319 of the Clean Water Act and the "Nonpoint Source Guidance" (December, 1987) issued by the EPA, the implementation of this management plan will be scheduled over four years. Because the management plan approval process set forth in Section 319 allows the EPA six months for approval or necessary modification of the plan, this milestone schedule will be given in time relative to the date of plan approval. The schedule will be in chart form and will follow the plan's order as presented in section III. The schedule will be broken down into quarters with each quarter representing a year's progress. This schedule will allow the Commonwealth to comply with Section 319 (h) (11) which requires that:

"(11) REPORTING AND OTHER REQUIREMENTS. - Each State shall report to the Administrator on an annual basis concerning (A) its progress in meeting the schedule of milestones submitted pursuant to subsection (b)(2)(C) of this section, and (B) to the extent that appropriate information is available, reductions in nonpoint source pollutant loading and improvements in water quality for those navigable waters or watersheds within the State which were identified pursuant to subsection (a)(1)(A) of this section resulting from implementation of the management program."

The agency abbreviations used in the chart are as follows:

EOEA: Executive Office of Environmental Affairs
CZM: Coastal Zone Management

DEQE: Department of Environmental Quality Engineering
DWPC: Division of Water Pollution Control
DWS: Division of Water Supply
DSW: Division of Solid Waste
DHW: Division of Hazardous Waste
DWW: Division of Wetlands and Waterways
OSP: Office of Special Projects
Reg. Off. : Regional Offices

DFA: Department of Food and Agriculture

DEM: Department of Environmental Management
DFP: Division of Forests and Parks
DWR: Division of Water Resources
DW: Division of Waterways

EOTC: Executive Office of Transportation and Construction
DPW: Department of Public Works

DPS: Department of Public Safety

MDC: Metropolitan District Commission
WMD: Watershed Management Division

CSWRR: Committee on Soil, Water and Related Resources

SFC: State Forestry Committee

SCD: State Conservation Districts

MACC: Massachusetts Association of Conservation Commissions

MAA: Massachusetts Municipal Association

Audubon: Audubon Society

RPA's: Regional Planning Agencies

USDA: United States Department of Agriculture

EPA: Environmental Protection Agency

NONPOINT SOURCE MANAGEMENT PLAN

MILESTONE SCHEDULE

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR			
		1	2	3	4
GROUNDWATER STRATEGY		X			
SHORT-TERM STRATEGIES					
Existing Statewide Programs					
SILVICULTURE					
1. Determine Adequacy of enforcement of forest cutting practice standards.	DEM/DFP SFC	X			
2. If adequate, then provide support and monitoring.	DEQE/DWPC		X	X	X
3. If inadequate, then determine needs for enforcement	DEM/DFP SFC		X		
4. Implement appropriate needs from 3 above, if necessary	DEM/DFP DEQE/DWPC			X	
6. R&D project on evaluation of NPS from silviculture.	DEQE/DWPC	X			
7. Prepare & evaluate GEIR on forest cutting practices	DEM/DFP	X			
AGRICULTURE					
1. SCD select projects	SCD	X			
2. Projects reviewed	USDA;DFA; DEM		X		
3. DWPC reviews, approves for funding	DEQE/DWPC		X		
4. Project implementation	SCD DEQE/DWPC			X	X
CONSTRUCTION					
1. Determine needs to implement/enforce Wetlands Protection Act.	MAAC DEQE/DWW	X			
2. Address needs of Wetland Act, if necessary	DEQE/DWPC DEQE/DWW		X		

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	END OF YEAR			
		1	2	3	4
3. Work toward enactment of erosion/sedimentation control law	DEQE;MACC; SCD;CSWRR; USDA	X	X	X	X
4. Work with others to implement the erosion/sedimentation control law, if it is enacted.	DEQE;SCD; USDA/SCS; CSWRR	[activity will follow in year after enactment]			
5. Assist CSWRR to develop 5-year natural resource action plan	DEQE/DWPC; CSWRR;SCD	X	X		
6. Work with others to implement 5-year natural resource action plan	DEQE/DWPC; CSWRR;SCD		X	X	
URBAN RUNOFF					
1. Buzzards Bay Project	EOEA/CZM			ON-GOING	
Buttermilk Bay Project	DEQE/DWPC EPA		X		
2. Shellfish NPS R&D study	DEQE/DWPC		X		
3. Implement BMP's from	DEQE/DWPC			X	X
4. Disseminate results from No. 2&3 above to towns/cities.	DEQE/DWPC				X
5. Waquoit Bay Survey	DEQE/DWPC	X			
6. a. North River NPS Project	DEQE/DWPC		X		
b. Implement North River NPS BMP's	DEQE/DWPC		X	X	
7. Develop Water Quality data management system	EOEA/CZM	X			
8. RPA's select projects	RPA's	X			
9. Projects reviewed	local entities; SCD		X		

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR 1	2	3	4
10. DWPC reviews, approves for funding.	DEQE/DWPC		X		
11. Project implementation	RPA's DEQE/DWPC			X	X
RESOURCE EXTRACTION					
1. Develop educ. & tech assistance.	DEQE/DWS	X			
2. Conduct statewide seminars	Audubon; DEQE/DWS		X		
LAND DISPOSAL					
1. Landfill assessment	DEQE/DSW	X	X	X	
2. Implementation of groundwater protection projects (from landfills).	DEQE/DSW			X	X
3. Review and revise sanitary landfill reg's for NPS control	DEQE/DSW		X		
4. Determine landfill regulation enforcement needs	DEQE/DSW	X			
5. Implement landfill reg. enforcement assistance.	DEQE/DSW; DEQE/DWPC		X	X	X
HAZARDOUS WASTE SITES					
1. Water quality monitor.	DEQE/DWPC	X	X	X	X
2. BMP technical assist.	DEQE/DWPC	X	X	X	X
HYDROLOGIC-HABITAT MODIFICATION					
1. Determine coastal NPS from dredging.	DEQE/DWPC	X			
2. Determine toxicity component of No. 1 above.	DEQE/DWPC		X		
3. Review coastal dredging reg's.	DEM/DW			X	

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR 1	2	3	4
4. Revise as appropriate coastal dredging reg's.	EOEA/CZM DEM/DW; DWR				X
UNDERGROUND STORAGE TANKS					
1. Revise Fire Fighting Academy curriculum to prevent leaks, safeguard environment.	DEQE; DPS		X		
2. Develop and implement UST program in DEQE.	DEQE/OSP; DPS		X	X	
ROAD DEICING CHEMICALS					
1. Update and reissue to all cities and town road salt booklet with BMP emphasis.	DEQE/DWS		X		
2. Focus on snow dumping as issue to address under No. 1 above.	DEQE/DWS			X	
3. Work with DPW to assess CMA and reduced salt use on roads.	DPW; DEQE/DWPC		X	X	X
TARGETED WATERSHED PROJECTS					
1. Select 10 demostration projects	DEQE/DWPC; RPA's; SCD		X		
2. Fund and implement 10 demonstration projects.	DEQE/DWPC		X	X	X
LONG-TERM STRATEGIES					
1. Title 5 regulations					
a. Task force to review/revise reg's.	EOEA		X		
b. Continue Title 5 seminars on regional basis.	DEQE Reg. off.	X			

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR			
		1	2	3	4
c. Approve and fund R&D project to develop a statistically valid and acceptable definition of high groundwater level for siting septic systems. Use results in No. a. above.	DEQE/DWPC	X			
d. Approve and fund R&D project to use soil morphology as indicator of maximum groundwater level. Use results in No. a above.	DEQE/DWPC	X			
2. Soil & Sedimentation Control Law					
a. Support enactment erosion/sedimentation control law.	DEQE	X	X	X	X
b. Work with MACC and Conservation districts to implement law, if enacted.	DEQE/DWPC; SCD		[activity will follow in year after enactment]		
3. Stormwater Runoff Controls					
a. Review and propose amendments to subdivision control law.	DEQE/DWPC	X			
b. File and support legislation relative to a above.	DEQE; MMA		X		
c. Review and propose amendments to Chap. 90 or regulations.	DEQE/DWPC; DPW	X			

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR			
		1	2	3	4
d. Work with DPW to implement amendments to Chp. 90 or regulations.	DPW			X	
e. Review state road regulations to control stormwater runoff.	DPW	X			
f. Implement amended state reg's or enforce existing reg's.	DPW			X	
g. Review federal DOT reg's for adequate stormwater runoff controls.	EOTC; DPW	X			
h. Work to implement DOT regulatory changes as approp. to allow BMP's on state roads using federal funds.	EOTC			X	
4. Groundwater Protection Program					
a. Update available base on NPS locations with GIS.	DEQE/DWS; DEQE/DWPC		X		
b. Provide focused technical assistance to local communities on groundwater protection.	DEQE/DWS		X		
c. Implement CCAMP recommendations for Cape Cod sole-source aquifer protection.	DEQE/OSP	X	X	X	X
d. Protection of groundwater from pesticides.	DFA	X			

MILESTONE SCHEDULE (CONTINUED)

MANAGEMENT PLAN	KEY AGENCY(IES)	BY END OF YEAR			
		1	2	3	4
5. Metro Boston Water Supply Watershed Protection Program.					
a. Assist MDC to develop watershed management plan	MDC/WMD		X		
b. Assist MDC to implement watershed plan in a. above.	MDC/WMD DEQE/DWPC		X		
6. Assessment Report Update and Expansion					
a. Water quality sampling for non-point source assessment.	DEQE/DWPC	X	X	X	X
b. Assessment of wetlands for NPS and water quality data.	DEQE/DWPC; DEQE/DWW		X	X	X
c. Use of GIS for NPS data. Work with DWS for overlay information.	DEQE/DWS; DEQE/DWPC	X	X	X	X
7. Establish State NPS Program					
a. Support and encourage enactment of legislation for state NPS program with funding for implementation.	DEQE/DWPC	X	X	X	X

VI Attorney General Certification

The certification of the Attorney General's Office has been completed as required and is appended to this plan.

VII Compliance With Executive Order 12372

This requirement of the nonpoint source management plan is clearly spelled out in Section 319 (b) (2) (F):

"(F) An identification of Federal financial assistance programs and Federal development projects for which the State will review individual assistance applications or development projects for their effect on water quality pursuant to the procedures set forth in Executive Order (E.O.) 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the State's nonpoint source pollution management program."

This section of the plan can be very important in order to effectuate the nonpoint source coordination of the various programs that receive federal assistance of one sort or another. The review process will include not only the perhaps better known environmental programs administered by the EPA under The Clean Water Act, Safe Drinking Water Act, Clean Air Act, Comprehensive Environmental Response, Compensation and Liability Act (Superfund) and Marine Protection, Research and Sanctuaries Act but also pertinent programs administered by The Department of Agriculture, Department of Transportation, Department of Defense, Department of Commerce and the like.

The strategy will be implemented in three ways:

A. The normal E.O. 12372 process, which replaced the former A-95 Clearinghouse process.

B. The National Environmental Policy Act process, and

C. The Massachusetts Environmental Policy Act (MEPA) process.

A. Executive Order 12372 Process

This procedure replaces the former A-95 Review and requires that all applications for federal assistance under about 150 identified federal programs must be reviewed and commented upon by state and regional "clearinghouses" prior to formal application. In Massachusetts the Executive Office of Communities and Development serves as the coordinating office for all activities under E.O. 12372. The nonpoint source program has been placed on their direct mailing list for review of all appropriate requests for federal assistance. Table 3 lists all those federal programs normally covered by the E.O. 12372 review process.

B. National Environmental Policy Act (NEPA)

(The following description of NEPA is taken from McGregor, 1981).

NEPA, 42 U.S.C. Section 4321, unites a poetically-worded national environmental policy with a statutory plan of action to implement that policy.One provision does most of the work; an action-forcing requirement that each Federal agency prepare a detailed statement of environment impact for each major Federal action which may significantly affect the quality of the human environment. This Environmental Impact Statement (EIS) requirement is set forth in Section 102 (2) (C) of NEPA. It is the cornerstone of the statute.

It is important to note what NEPA does not do. It does not establish the right to a clean environment. It does not stop growth. It does not itself entitle private citizens or any other officials or agencies to enforce NEPA or any other law. It does not forbid any projects or programs of the Federal government. It does not confer veto power upon any agency over programs and projects. It does not provide funding for pollution abatement equipment or activities.

NEPA does, however, mandate a significant change in agency decision-making. It has given rise to a new body of case law in court decisions, new sets of regulations, new data, new institutions, new rights and obligations, and new roles for public officials at all levels, for private industry working with government officials and for private citizens who would like to participate in the decision-making process.

The rationale for the EIS requirement, as seen by Congress, the agencies and the courts, is to disclose the environmental and related economic and social consequences of a project in advance, thus alerting the decision-maker, the public, the United States Environmental Protection Agency (EPA) and the Council on Environmental Quality (CEQ) (and ultimately Congress and the President) in a way that reshapes or postpones or cancels a project accordingly, or at least redirects agency policies, plans and programs to meet environmental goals. A secondary function of EIS is to raise the environmental consciousness of agencies in all their deliberations. It also has been observed that the EIS serves as an agency record of environmental deliberations for later court review on any challange. Moreover, the EIS is designed to save money and time overall in avoiding the costly and wasteful consequences of ill-planned projects.

The actions for which agencies must prepare impact statements must be "major," "federal" and environmentally "significant." NEPA reaches agency recommendations on their own proposals for legislation; agency reports on legislation initiated elsewhere but concerning subject matter for which the agency has primary responsibility; projects and continuing activities which may be undertaken directly by an agency, supported in whole or in part through Federal contracts, grants, subsidies, loans or other forms of funding assistance or authorized by a federal lease, permit, license, certificate or other entitlement for use; and decisions on policy and issuance of regulations. Most of the projects covered by NEPA are those affecting private citizens and public officials directly, including, for example, highways, water resource projects, housing programs, construction of government facilities, licenses for nuclear plants, approval of airport runways, leasing for offshore oil, dredging and fill permits in navigable waters, application of pesticides, and forestry practices. Not all of these, of course, necessarily are considered major or environmentally significant.

The nonpoint source program has been placed on the NEPA mailing list from two NEPA offices:

1. The Environmental Evaluation Section of the EPA which handles all NEPA related activities where the EPA is the lead agency.

2. The Government Relations and Environmental review office of EPA which handles all other federal agency NEPA activities.

The nonpoint source program will receive all appropriate notice of intents relative to the NEPA review procedure from these two offices. In addition, we have been placed on the EPA mailing list for all Environmental Assessments and Findings of No Significant Impacts for projects in the state to ensure coordination on areas that may involve some degree of environmental modification.

Table 3 also lists those federal programs which have been determined to have a significant effect on the environment and require an environmental assessment or an EIS under NEPA. Although the list is not inclusive, it contains programs normally requiring either an environmental assessment or an environmental impact statement.

C. Massachusetts Environmental Policy Act (MEPA)

(The following description of MEPA is taken from McGregor, 1981.)

By virtue of M.G.L. Chapter 30, Sections 61 through 62H, all agencies, departments, boards, commissions and authorities of the Commonwealth (and a few authorities of political subdivisions such as housing authorities and redevelopment authorities which are statutorily created as "authorities") must prepare, circulate and consider an Environmental Impact Report (EIR) (as distinguished from the "EIS" under NEPA) 60 days prior to undertaking any project "which may cause damage to the environment," including to a limited extent licenses and permits to private projects. Only that portion of a private project that is subject to permit or license is reviewed. Preparation of the EIR is by the project proponent (agency or private), unlike NEPA.

Primarily through state licenses and other approvals, and state agency resolution of appeals from local boards of health and conservation commissions, private development and local governmental actions can become subject to MEPA.

The Secretary of EOEA issues Environmental Notification Forms which must be utilized in deciding whether an EIR is warranted. EOEA decides the scope, form, content, alternatives, and level of detail required for an EIR (Section 62A), publishes notice of important decisions regarding an EIR, and reviews whether the draft and final EIR "adequately and properly complies" with MEPA (Section 62C). EOEA publishes the Environmental Monitor (available by free subscription) covering MEPA and other environmental matters.

1. Content of Environmental Impact Reports

As under NEPA, each Environmental Impact Report under MEPA must contain detailed statements describing: the nature and extent of the proposed work and its environmental impact; all measures being utilized to minimize environmental damage; any adverse short-term and long-term environmental consequences which cannot be avoided should the work be performed; and alternatives to the proposed action and their environmental consequences (Section 62B).

2. Threshold of "Significant" Impact

Only works, projects and activities which may cause "significant" damage to the environment are subject to these full requirements (Section 61). Most routine governmental functions are exempt by virtue of "Categorical Exemptions" created by EOEA regulations. The new regulations also include Categorical Inclusions" (automatic EIR requirement for certain activities).

3. Preliminary Notification Forms

For individual governmental functions not categorically exempt, as described above, there must be a completed Environmental Notification Form (ENF) evaluating whether the work, project or activity will cause significant damage to the environment. For private projects subject to NEPA because of state permits or funding, the ENF is prepared by the applicant. All filings are with the "MEPA Unit" of EOEA.

Note that under MEPA as amended by Statute 1977, Chapter 947 (adding section 62A) the sponsoring agency or project proponent will no longer make the judgment whether an EIR is warranted; the secretary of EOEA will make that determination. This occurs 30 days after the ENF is published in the Monitor. A 20 day comment period is provided. All comments should be addressed to the "MEPA Unit."

4. EIR Circulation

The draft EIR is filed with the MEPA unit and circulated according to the regulations. Notice appears in the Monitor. There is a 30 day comment period, after which the Secretary, within seven days, issues a statement about whether the draft is adequate. The same process applies to final EIRs.

The nonpoint source program is on the Monitor mailing list and will reveiw all ENF's for possible nonpoint pollution concerns. The nonpoint source program will comment upon any projects which appear to have potential nonpoint source pollution problems.

TABLE 3

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1237
DEPARTMENT OF AGRICULTURE					
10.001 Agricultural Research—Basic and Applied Research (B)				X	
10.025 Plant and Animal Disease and Pest Control (B,J)	X	X		X	X
10.028 Animal Damage Control (J,K,L,M)	X	X		X	X
10.069 Conservation Reserve Program (C)			X		
10.070 Colorado River Salinity Control (C)					X
10.140 Minority Research and Teaching Grants (B,K)				X	
10.153 Market News (L)	X				
10.156 Federal-State Marketing Improvement Program (B)	X	X			X
10.164 Wholesale Market Development (K)	X	X			X
10.200 Grants for Agricultural Research, Special Research Grants (B)				X	
10.202 Cooperative Forestry Research (A)				X	
10.203 Payments to Agricultural Experiment Stations Under Hatch Act (A)				X	
10.205 Payments to 1890 Land-Grant Colleges and Tuskegee University (A)				X	
10.206 Grants for Agricultural Research—Competitive Research Grants (B)				X	
10.207 Animal Health and Disease Research (A)				X	
10.209 1890 Research Facilities (A)				X	
10.210 Food and Agricultural Sciences National Needs Graduate Fellowship Grants (B)				X	
10.211 Higher Education Strengthening Grants (B)				X	
10.213 Competitive Research Grants for Forest and Rangeland Renewable Resources (B)				X	
10.214 Morrill-Nelson Funds for Food and Agricultural Higher Education (B)		X			
10.215 Low Input Farming Systems—Research and Education (B)	X	X		X	
10.350 Technical Assistance to Cooperatives (K,L)	X	X		X	
10.405 Farm Labor Housing Loans and Grants (B,F)	X	X	X	X	X
10.411 Rural Housing Site Loans (E)			X		X
10.414 Resource Conservation and Development Loans (E)		X	X	X	X
10.415 Rural Rental Housing Loans (F)			X		X
10.416 Soil and Water Loans (F)					X
10.418 Water and Waste Disposal Systems for Rural Communities (B,E)	X	X	X	X	X
10.419 Watershed Protection and Flood Prevention Loans (E)		X	X	X	X
10.420 Rural Self-Help Housing Technical Assistance (B)		X	X	X	X
10.421 Indian Tribes and Tribal Corporation Loans (F)		X			X
10.422 Business and Industrial Loans (F)			X		X
10.423 Community Facilities Loans (E)		X	X	X	X
10.424 Industrial Development Grants (B)		X	X		X
10.427 Rural Rental Assistance Payments (C)					X
10.433 Rural Housing Preservation Grants (B)	X	X	X	X	X
10.434 Nonprofit National Corporations Loan and Grant Program (B,F)		X	X	X	X
10.435 Agricultural Loan Mediation Program (B)	X	X			
10.475 Cooperative Agreements with States for Intrastate Meat and Poultry Inspection (B)	X	X			X
10.500 Cooperative Extension Service (A)				X	
10.550 Food Distribution (H)		X			X
10.553 School Breakfast Program (A)	X	X		X	X
10.555 National School Lunch Program (A)	X	X		X	X
10.556 Special Milk Program for Children (A)	X	X		X	X
10.557 Special Supplemental Food Program for Women, Infants, and Children (A)	X	X			X
10.558 Child Care Food Program (A,H)	X	X		X	X
10.559 Summer Food Service Program for Children (A)	X				X
10.560 State Administrative Expenses for Child Nutrition (A)	X	X			X
10.561 State Administrative Matching Grants for Food Stamp Program (A)	X	X			X
10.564 Nutrition Education and Training Program (A)	X	X			X
10.565 Commodity Supplemental Food Program (A,H)	X	X			X
10.566 Nutrition Assistance For Puerto Rico (C)	X	X			X
10.567 Food Distribution Program on Indian Reservations (B,H)	X	X			X
10.568 Temporary Emergency Food Assistance (Administrative Costs) (A)	X	X			X
10.652 Forestry Research (B)	X	X		X	
10.664 Cooperative Forestry Assistance (A,B,I)	X	X	X		X
10.666 Schools and Roads—Grants to Counties (A)		X			
10.669 Accelerated Cooperative Assistance for Forest Programs on Certain Lands Adjacent to the Boundary Waters Canoe Area (B)	X	X			X
10.850 Rural Electrification Loans and Loan Guarantees (F)			X		
10.851 Rural Telephone Loans and Loan Guarantees (F)			X		
10.852 Rural Telephone Bank Loans (E)			X		
10.901 Resource Conservation and Development (B,K)	X	X	X	X	X

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10.904 Watershed Protection and Flood Prevention (B,K)	X	X	X		X
10.906 River Basin Surveys and Investigations (J)					X
10.960 Technical Agricultural Assistance (B)				X	
10.961 International Agricultural Research—Collaborative Program (B)				X	
10.962 International Training—Foreign Participant (B)				X	

DEPARTMENT OF COMMERCE

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1
11.111 Foreign-Trade Zones in the United States (J)			X		
11.300 Economic Development—Grants for Public Works and Development Facilities (B)	X	X	X	X	X
11.301 Economic Development—Business Development Assistance (F)			X		X
11.302 Economic Development—Support for Planning Organizations (B)	X	X			X
11.303 Economic Development—Technical Assistance (B)	X	X		X	X
11.304 Economic Development—Public Works Impact Projects (B)	X	X	X	X	X
11.305 Economic Development—State and Local Economic Development Planning (B)	X	X			X
11.307 Special Economic Development and Adjustment Assistance Program—Sudden and Severe Economic Dislocation and Long-Term Economic Deterioration (B)	X	X	X	X	X
11.312 Research and Evaluation Program (B)	X	X		X	X
11.400 Geodetic Surveys and Services (J,K,L)	X	X		X	
11.405 Anadromous and Great Lakes Fisheries Conservation (B)			X		X
11.407 Interjurisdictional Fisheries Act of 1986 (A)	X	X		X	X
11.417 Sea Grant Support (B)	X				X
11.419 Coastal Zone Management Program Administration Grants (A,B)	X	X	X		X
11.420 Coastal Zone Management Estuarine Research Reserves (B)	X	X		X	X
11.426 Financial Assistance for Marine Pollution Research (B)					X
11.427 Fisheries Development and Utilization Research and Development Grants and Cooperative Agreements Program (B)					X
11.428 Intergovernmental Climate—Programs (B)					X
11.429 Marine Sanctuary Program (B)	X	X		X	
11.430 Undersea Research (B)	X	X		X	
11.431 Climate and Atmospheric Research (B)	X	X		X	
11.550 Public Telecommunications Facilities—Construction and Planning (B)	X	X	X	X	X
11.603 National Standard Reference Data System (B,L)				X	
11.609 Measurement and Engineering Research and Standards (B)	X	X		X	
11.800 Minority Business Development Centers (B)	X	X		X	
11.801 American Indian Program (B)	X	X		X	
11.802 Minority Business and Industry Association—Minority Chambers of Commerce (B)		X		X	

DEPARTMENT OF DEFENSE

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1
12.002 Procurement Technical Assistance For Business Firms (B)	X			X	
12.100 Aquatic Plant Control (J,L)	X				X
12.101 Beach Erosion Control Projects (J)			X		X
12.104 Flood Plain Management Services (K,L)					X
12.105 Protection of Essential Highways, Highway Bridge Approaches, and Public Works (J)			X		X
12.106 Flood Control Projects (J)			X		X
12.107 Navigation Projects (J)			X		X
12.108 Snagging and Clearing for Flood Control (J)			X		X
12.109 Protection, Clearing and Straightening Channels (J)					X
12.110 Planning Assistance to States (J)					X
12.400 Military Construction, Army National Guard (B)			X		
12.607 Military Base Reuse Studies and Community Planning Assistance (B)		X			
12.608 Impact Assistance for Areas Affected by the East Coast Trident Program (B)	X	X			

DEPARTMENT OF HEALTH AND HUMAN SERVICES

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1
13.103 Food and Drug Administration—Research (B)	X	X		X	
13.108 Health Education Assistance Loans (F)				X	
13.110 Maternal and Child Health Federal Consolidated Programs (B)	X	X		X	
13.111 Adolescent Family Life Research Grants (B)	X	X		X	
13.112 Characterization of Environmental Health Hazards (B)	X	X		X	
13.113 Biological Response to Environmental Health Hazards (B)	X	X		X	
13.114 Applied Toxicological Research and Testing (B)	X	X		X	

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.12372
13.115 Biometry and Risk Estimation—Health Risks from Environmental Exposures (B)	X	X		X	
13.116 Project Grants and Cooperative Agreements for Tuberculosis Control Programs (B)	X	X			X
13.117 Grants for Preventive Medicine Residency Training (B)				X	
13.118 Acquired Immunodeficiency Syndrome (AIDS) Activity (B)	X	X		X	
13.119 Grants for Podiatric Medicine Training (B)				X	
13.120 Mental Health Services for Cuban Entrants (B)	X	X		X	X
13.121 Diseases of the Teeth and Supporting Tissues (B)	X	X		X	
13.122 Disorders of Craniofacial Structure and Function, and Behavioral Aspects of Dentistry (B)	X	X		X	
13.124 Nurse Anesthetist Traineeships (B)				X	
13.125 Mental Health Planning and Demonstration Projects (B)	X	X			X
13.128 Refugee Assistance—Mental Health (B)	X	X			X
13.129 Technical and Non-Financial Assistance to Community Health Centers (B)	X	X		X	X
13.130 Primary Care Services—Planning and Development Cooperative Agreements (B)	X	X		X	X
13.132 Acquired Immunodeficiency Syndrome (AIDS) Research (B)	X	X		X	
13.133 Health Services Delivery to Persons with AIDS—Demonstration Grants (B).	X	X		X	X
13.134 Assistance for Organ Procurement Organizations (B)				X	X
13.135 Centers for Research and Demonstration for Health Promotion and Disease Prevention (B)				X	
13.136 Injury Control—Research and Demonstration Projects and Prevention Research Centers (B)	X	X		X	
13.137 Minority Community Health Coalition Demonstration (B)	X	X		X	X
13.138 Protection and Advocacy for Mentally Ill Individuals (A)	X	X		X	
13.139 Financial Assistance for Disadvantaged Health Professions Students (FADHPS) (B)				X	
13.142 NIEHS Hazardous Waste Worker Health and Safety Training (B)	X	X		X	
13.143 NIEHS Superfund Hazardous Substances—Basic Research and Education (B)	X	X		X	
13.144 Drug and Alcohol Abuse—High-Risk Youth Demonstration Grants (B)	X	X		X	X
13.145 AIDS Education and Training Centers (B)	X	X		X	X
13.146 AIDS Drug Reimbursements (A)	X	X			
13.147 Post-Baccalaureate Faculty Fellowships (B)				X	
13.148 Leadership and Excellence in Alzheimer's Disease and Related Dementias (B)	X	X		X	
13.149 Grants for Two-Year Programs of Schools of Medicine or Osteopathy (B)			X	X	X
13.151 Project Grants for Health Services to the Homeless (B)	X	X		X	X
13.152 Community Demonstration Grant Projects for Alcohol and Drug Abuse Treatment of Homeless Individuals (B)	X	X		X	X
13.153 Pediatric AIDS Health Care Demonstration Program (B)	X	X		X	X
13.154 Special International Postdoctoral Research Program in Acquired Immunodeficiency Syndrome (B)				X	
13.155 Rural Health Policy/Research Centers (B)	X	X		X	X
13.156 Grants for Faculty Training Projects in Geriatric Medicine and Dentistry (B)				X	
13.157 Excellence in Minority Health Education and Care (B)				X	
13.158 State Comprehensive Mental Health Service Planning Development Grants (A)	X	X			
13.217 Family Planning—Services (B)	X	X		X	X
13.224 Community Health Centers (B)	X	X		X	X
13.225 National Research Service Awards—Health Services Research Training (B)	X	X		X	
13.226 Health Services Research and Development Grants (B)	X	X		X	
13.228 Indian Health Service—Health Management Development Program (B)	X	X		X	
13.242 Mental Health Research Grants (B)	X	X		X	
13.244 Mental Health Clinical or Service Related Training Grants (B)	X	X		X	
13.246 Migrant Health Centers Grants (B)	X	X		X	X
13.258 National Health Service Corps (EJ)					X
13.260 Family Planning—Personnel Training (B)	X	X		X	X
13.262 Occupational Safety and Health Research Grants (B)	X	X		X	
13.263 Occupational Safety and Health—Training Grants (B)	X	X		X	
13.268 Childhood Immunization Grants (B)	X	X			X
13.271 Alcohol Research Scientist Development and Research Scientist Awards (B).	X	X		X	
13.272 Alcohol National Research Service Awards for Research Training (B)	X	X		X	
13.273 Alcohol Research Programs (B)	X	X		X	
13.277 Drug Abuse Research Scientist Development and Research Scientist Awards (B)	X	X		X	
13.278 Drug Abuse National Research Service Awards for Research Training (B)	X	X		X	

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13.279 Drug Abuse Research Programs (B)	X	X		X	
13.281 Mental Health Research Scientist Development and Research Scientist Awards (B)	X	X		X	
13.282 Mental Health National Research Service Awards for Research Training (B)	X	X		X	
13.283 Centers for Disease Control—Investigations and Technical Assistance (J,K,L,M)	X	X		X	X
13.298 Nurse Practitioner and Nurse Midwife Education and Traineeships (B)	X	X		X	
13.299 Advanced Nurse Education (B)				X	
13.306 Laboratory Animal Sciences and Primate Research (B)	X	X		X	
13.333 General Clinical Research Centers (B)				X	
13.337 Biomedical Research Support (B)	X	X		X	
13.339 Capitation Grants for Schools of Public Health (A)				X	
13.342 Health Professions Student Loans (E)				X	
13.358 Professional Nurse Traineeships (B)				X	
13.359 Nurse Training Improvement—Special Projects (B)	X	X		X	
13.361 Nursing Research (B)	X	X		X	
13.364 Nursing Student Loans (E)				X	
13.371 Biomedical Research Technology (B)	X			X	
13.375 Minority Biomedical Research Support (B)	X	X		X	
13.379 Grants for Graduate Training in Family Medicine (B)				X	
13.389 Research Centers in Minority Institutions (B)				X	
13.390 Academic Research Enhancement Award (B)				X	
13.393 Cancer Cause and Prevention Research (B)	X	X		X	
13.394 Cancer Detection and Diagnosis Research (B)	X	X		X	
13.395 Cancer Treatment Research (B)	X	X		X	
13.396 Cancer Biology Research (B)	X	X		X	
13.397 Cancer Centers Support (B)	X	X		X	
13.398 Cancer Research Manpower (B)				X	
13.399 Cancer Control (B)	X	X		X	
13.600 Administration for Children, Youth and Families—Head Start (B)	X	X		X	X
13.608 Administration for Children, Youth and Families—Child Welfare Research and Demonstration (B)	X	X		X	
13.612 Native American Programs—Financial Assistance Grants (B)	X	X		X	
13.614 Child Development Associate Scholarships (A)	X	X			
13.623 Administration for Children, Youth and Families—Runaway and Homeless Youth (B)	X	X		X	X
13.630 Administration on Developmental Disabilities—Basic Support and Advocacy Grants (A)	X	X		X	X
13.631 Administration on Developmental Disabilities—Projects of National Significance (B)	X	X		X	X
13.632 Administration on Developmental Disabilities—University Affiliated Programs (B)				X	
13.633 Special Programs for the Aging—Title III, Part B—Grants for Supportive Services and Senior Centers (A)	X	X			X
13.635 Special Programs for the Aging—Title III, Part C—Nutrition Services (A)	X	X			X
13.641 Special Programs for the Aging—Title III, Part D—In-Home Services for Frail Older Individuals (A)	X	X			X
13.643 Children's Justice Grants to States (A)	X				
13.645 Child Welfare Services—State Grants (A)	X	X			X
13.647 Social Services Research and Demonstration (B)	X	X		X	
13.648 Child Welfare Services Training Grants (B)				X	
13.652 Administration for Children, Youth and Families—Adoption Opportunities (B)	X	X		X	
13.655 Special Programs for the Aging—Title VI, Part A—Indian Programs (B)	X	X			
13.656 Temporary Child Care and Crisis Nurseries (B)	X				
13.658 Foster Care—Title IV-E (A)	X	X			
13.659 Adoption Assistance (A)	X	X			
13.661 Native American Programs—Research, Demonstration, and Evaluation (B)	X	X		X	
13.662 Native American Programs—Training and Technical Assistance (B)	X	X		X	
13.668 Special Programs for the Aging—Title IV—Training, Research and Discretionary Projects and Programs (B)	X	X		X	
13.669 Administration for Children, Youth and Families—Child Abuse and Neglect State Grants (A)	X	X			X
13.670 Administration for Children, Youth and Families—Child Abuse and Neglect Discretionary Activities (B)	X	X		X	X
13.671 Family Violence Prevention and Services (A,B)	X	X			X
13.672 Child Abuse Challenge Grants (A)	X	X			

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13.673 Grants to States for Planning and Development of Dependent Care Programs (A)	X	X			X
13.674 Independent Living (A)	X	X			
13.714 Medical Assistance Program (A)	X	X			
13.766 Health Care Financing Research. Demonstrations and Evaluations (B)	X	X		X	
13.775 State Medicaid Fraud Control Units (A)	X	X			
13.777 State Survey and Certification of Health Care Providers and Suppliers (A,B)	X				
13.780 Family Support Payments to States—Assistance Payments (A)	X	X			
13.782 Assistance Payments—Research (B)	X	X		X	
13.783 Child Support Enforcement (A)	X	X			
13.784 Child Support Enforcement Research (B)	X	X		X	
13.785 Child Support Enforcement Interstate Grants (B)	X	X		X	
13.786 State Legalization Impact Assistance Grants (A)	X	X			
13.787 Refugee and Entrant Assistance—State Administered Programs (D)	X	X			
13.788 Refugee Assistance—Voluntary Agency Programs (B)				X	
13.790 Work Incentive Program (A)	X	X			X
13.793 Community Services Block Grant—Discretionary Awards (C)	X	X		X	X
13.795 Community Services Block Grant Discretionary Awards—Community Food and Nutrition (A,C)	X	X		X	X
13.797 Community Services Block Grant Discretionary Awards—Demonstration Partnerships (B)	X	X		X	X
13.812 Social Security—Research and Demonstration (B)	X	X		X	
13.820 Scholarships for First-Year Students of Exceptional Financial Need (B)		X		X	
13.821 Biophysics and Physiological Sciences (B)	X	X		X	
13.822 Health Careers Opportunity Program (B)	X	X		X	
13.824 Area Health Education Centers (B)				X	
13.837 Heart and Vascular Diseases Research (B)	X	X		X	
13.838 Lung Diseases Research (B)	X	X		X	
13.839 Blood Diseases and Resources Research (B)	X	X		X	
13.845 Dental Research Institutes—Research Centers in Oral Biology (B)	X	X		X	
13.846 Arthritis, Musculoskeletal and Skin Diseases Research (B)	X	X		X	
13.847 Diabetes, Endocrinology and Metabolism Research (B)	X	X		X	
13.848 Digestive Diseases and Nutrition Research (B)	X	X		X	
13.849 Kidney Diseases, Urology and Hematology Research (B)	X	X		X	
13.853 Clinical Research Related to Neurological and Communicative Disorders (B)	X	X		X	
13.854 Biological Basis Research in the Neurosciences and Communicative Sciences (B)	X	X		X	
13.855 Immunology, Allergic and Immunologic Diseases Research (B)	X	X		X	
13.856 Microbiology and Infectious Diseases Research (B)	X	X		X	
13.859 Pharmacological Sciences (B)	X	X		X	
13.862 Genetics Research (B)	X	X		X	
13.863 Cellular and Molecular Basis of Disease Research (B)	X	X		X	
13.864 Population Research (B)	X	X		X	
13.865 Research for Mothers and Children (B)	X	X		X	
13.866 Aging Research (B)	X	X		X	
13.867 Retinal and Choroidal Diseases Research (B)	X	X		X	
13.868 Anterior Segment Diseases Research (B)	X	X		X	
13.871 Strabismus, Amblyopia and Visual Processing (B)	X	X		X	
13.879 Medical Library Assistance (B)	X	X		X	
13.880 Minority Access to Research Careers (B)				X	
13.884 Grants for Residency Training in General Internal Medicine and/or General Pediatrics (B)				X	
13.886 Grants for Physician Assistant Training Program (B)	X	X		X	
13.887 Project Grants for Non-Acute Care Intermediate and Long-Term Care Facilities (B)			X	X	X
13.891 Alcohol Research Center Grants (B)	X	X		X	
13.894 Resource and Manpower Development in the Environmental Health Sciences (B)	X	X		X	
13.895 Grants for Faculty Development in Family Medicine (B)				X	
13.896 Grants for Predoctoral Training in Family Medicine (B)				X	
13.897 Residency Training and Advanced Education in the General Practice of Dentistry (B)				X	
13.900 Grants for Faculty Development in General Internal Medicine and/or General Pediatrics (B)				X	
13.962 Health Administration Graduate Traineeships (A)				X	
13.963 Graduate Programs in Health Administration (A)				X	

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13.964 Traineeships for Students in Schools of Public Health and Other Graduate Public Health Programs (A)				X	
13.965 Coal Miners Respiratory Impairment Treatment Clinics and Services (B)	X	X		X	X
13.969 Health Professions Special Educational Initiatives (B)				X	
13.970 Health Professions Recruitment Program for Indians (B)	X	X		X	
13.974 Family Planning—Services Delivery Improvement Research Grants (B)	X	X		X	
13.977 Preventive Health Services—Sexually Transmitted Diseases Control Grants (B)	X	X			X
13.978 Preventive Health Services—Sexually Transmitted Diseases Research, Demonstrations, and Public Information and Education Grants (B)	X	X		X	
13.982 Mental Health Disaster Assistance and Emergency Mental Health (B)	X	X		X	
13.984 Grants for Establishment of Departments of Family Medicine (B)				X	
13.987 Health Programs for Refugees (B)	X	X			X
13.988 Cooperative Agreements for State-Based Diabetes Control Programs (B)	X	X			X
13.989 Senior International Awards Program (B)				X	
13.990 National Health Promotion (B)				X	X
13.995 Adolescent Family Life—Demonstration Projects (B)	X	X		X	X
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT					
14.103 Interest Reduction Payments—Rental and Cooperative Housing for Lower Income Families (C,F)			X		
14.112 Mortgage Insurance—Construction or Substantial Rehabilitation of Condominium Projects (F)					X
14.115 Mortgage Insurance—Development of Sales Type Cooperative Projects (F)			X		X
14.116 Mortgage Insurance—Group Practice Facilities (F)			X		X
14.117 Mortgage Insurance—Homes (F)			X		
14.121 Mortgage Insurance—Homes in Outlying Areas (F)			X		
14.123 Mortgage Insurance—Housing in Older, Declining Areas (F)					X
14.124 Mortgage Insurance—Investor Sponsored Cooperative Housing (F)			X		X
14.125 Mortgage Insurance—Land Development (F)			X		X
14.126 Mortgage Insurance—Management Type Cooperative Projects (F)			X		X
14.127 Mortgage Insurance—Manufactured Home Parks (F)			X		X
14.128 Mortgage Insurance—Hospitals (F)			X		X
14.129 Mortgage Insurance—Nursing Homes, Intermediate Care Facilities and Board and Care Homes (F)			X		
14.133 Mortgage Insurance—Purchase of Units in Condominiums (F)			X		
14.134 Mortgage Insurance—Rental Housing (F)			X		X
14.135 Mortgage Insurance—Rental Housing for Moderate Income Families (F)			X		X
14.137 Mortgage Insurance—Rental and Cooperative Housing for Moderate Income Families, Market Interest Rate (F)			X		X
14.138 Mortgage Insurance—Rental Housing for the Elderly (F)			X		X
14.139 Mortgage Insurance—Rental Housing in Urban Renewal Areas (F)			X		X
14.151 Supplemental Loan Insurance—Multifamily Rental Housing (F)					X
14.157 Housing for the Elderly or Handicapped (E)			X		X
14.164 Operating Assistance for Troubled Multifamily Housing Projects (B,C)				X	
14.169 Housing Counseling Assistance Program (B)		X		X	
14.170 Congregate Housing Services Program (B)				X	X
14.174 Housing Development Grants (B)	X	X	X		X
14.178 Supportive Housing Demonstration Program (B,C)	X	X	X	X	
14.218 Community Development Block Grants/Entitlement Grants (A)	X	X	X		X
14.219 Community Development Block Grants/Small Cities Program (B)	X				
14.221 Urban Development Action Grants (B)	X	X	X		X
14.223 Indian Community Development Block Grant Program (B)	X	X	X		
14.225 Community Development Block Grants/Secretary's Discretionary Fund/ Insular Area (B)	X	X			
14.227 Community Development Block Grants/Secretary's Discretionary Fund/ Technical Assistance Program (B,C)	X	X		X	
14.230 Rental Housing Rehabilitation (A)	X	X			
14.232 Community Development Block Grant/Secretary's Discretionary Fund/ Special Projects (B)	X				
14.401 Fair Housing Assistance Program—State and Local (B)	X	X			X
14.403 Community Housing Resource Board Program (B)		X			
14.506 General Research and Technology Activity (B)				X	
14.510 Supplemental Assistance for Facilities to Assist the Homeless (B,E)	X	X		X	
14.550 Solar Energy and Energy Conservation Bank (B)	X			X	
14.850 Public and Indian Housing (C)			X		X
14.851 Low Income Housing—Homeownership Opportunities for Low Income Families (C,E)			X		X

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14.852 Public and Indian Housing—Comprehensive Improvement Assistance Program (B,C,E)					X
DEPARTMENT OF THE INTERIOR					
15.142 Self Determination Grants—Indian Tribal Governments (B)	X	X			
15.143 Training and Technical Assistance—Indian Tribal Governments (B,J,K,M)	X	X			
15.144 Indian Child Welfare Act—Title II Grants (B)	X	X			
15.145 Indian Grants—Economic Development (Indian Grant Program) (B,C)	X	X			
15.214 Non-Sale Disposals of Mineral Material (H)			X		
15.219 Wildlife Habitat Management Technical Assistance (B)	X	X			
15.221 Cooperative Agreements for Research in Public Lands Management (B)	X	X		X	
15.250 Regulation of Surface Coal Mining and Surface Effects of Underground Coal Mining (B,C)	X	X			X
15.252 Abandoned Mine Land Reclamation (AMLR) Program (A,B)	X	X			X
15.308 Grants for Mining and Mineral Resources and Research Institutes (A,B)				X	
15.501 Distribution System Loans (E)			X		X
15.502 Irrigation Systems Rehabilitation and Betterment (E)			X		X
15.503 Small Reclamation Projects (B,E)			X		X
15.600 Anadromous Fish Conservation (B)	X	X	X		X
15.605 Sport Fish Restoration (A)	X	X	X		X
15.611 Wildlife Restoration (A)	X	X	X		X
15.612 Endangered Species Conservation (B)	X	X	X		X
15.805 Assistance to State Water Resources Research Institutes (A)				X	
15.806 National Water Resources Research Program (B)	X	X		X	
15.807 Earthquake Hazards Reduction Program (B)	X	X		X	
15.808 Geological Survey—Research and Data Acquisition (B)	X	X		X	
15.875 Economic and Political Development of the Territories and the Trust Territory of the Pacific Islands (B)	X	X			
15.904 Historic Preservation Fund Grants-In-Aid (B)	X	X	X	X	X
15.916 Outdoor Recreation—Acquisition, Development and Planning (B)	X	X	X		X
15.919 Urban Park and Recreation Recovery Program (B)	X				X
DEPARTMENT OF JUSTICE					
16.201 Cuban and Haitian Entrant Resettlement Program (C)					X
16.540 Juvenile Justice and Delinquency Prevention—Allocation to States (A)	X	X	X		X
16.541 Juvenile Justice and Delinquency Prevention—Special Emphasis and Technical Assistance (B)	X	X		X	X
16.542 National Institute for Juvenile Justice and Delinquency Prevention (B)	X	X		X	
16.543 Missing Children's Assistance (B)	X	X		X	X
16.550 Criminal Justice-Statistics Development (B)	X	X			X
16.560 Justice Research and Development Project Grants (B,L)	X	X		X	
16.561 National Institute of Justice Visiting Fellowships (B)	X	X		X	
16.562 Criminal Justice Research and Development—Graduate Research Fellowships (B)				X	
16.572 Mariel—Cubans (B)	X	X			X
16.573 Criminal Justice Block Grants (A)	X	X			X
16.574 Criminal Justice Discretionary Grants (B)	X	X		X	X
16.575 Crime Victim Assistance (A)	X	X			X
16.576 Crime Victim Compensation (A)	X	X			X
16.577 Emergency Federal Law Enforcement Assistance (B)	X	X			
16.578 Federal Surplus Property Transfer Program (I)					X
16.579 State and Local Narcotics Control Assistance (A)	X	X			X
16.580 Narcotics Control Discretionary Grant Program (B)	X	X		X	X
16.581 Drug Law Enforcement Program—Prison Capacity (B)	X	X		X	X
16.582 Crime Victim Assistance/Discretionary Grants (B,C)	X	X			
16.601 Corrections—Training and Staff Development (B,J,L,M)	X	X	X	X	
16.602 Corrections—Research and Evaluation and Policy Formulation (B,J,L)	X	X	X	X	
16.603 Corrections—Technical Assistance/Clearinghouse (B,J,L)	X	X	X	X	X
DEPARTMENT OF LABOR					
17.207 Employment Service (A,J,K)	X	X			X
17.225 Unemployment Insurance (A,D)	X	X			
17.235 Senior Community Service Employment Program (A,B)	X	X		X	X
17.247 Migrant and Seasonal Farmworkers (A,B)	X	X		X	X
17.248 Employment and Training Research and Development Projects (B)				X	
17.249 Employment Services and Job Training—Pilot and Demonstration Programs (B)	X			X	

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17.250 Job Training Partnership Act (A)					X
17.251 Native American Employment and Training Programs (A)	X	X		X	
17.500 Occupational Safety and Health (B,K,L,M,N)	X	X		X	
17.600 Mine Health and Safety Grants (B)	X	X			X
17.801 Disabled Veterans Outreach Program (A)		X			X
17.802 Veterans Employment Program (B)		X		X	X
17.804 Local Veterans Employment Representative Program (A)	X	X			X

DEPARTMENT OF TRANSPORTATION

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1237
20.001 Boating Safety (J,L,M)					X
20.005 Boating Safety Financial Assistance (A,B)	X	X		X	X
20.106 Airport Improvement Program (B,K)	X	X	X		X
20.107 Airway Science (B,I)				X	
20.205 Highway Planning and Construction (A,B)	X	X	X		X
20.214 Highway Beautification—Control of Outdoor Advertising, and Control of Junkyards (B)	X	X			X
20.218 Motor Carrier Safety Assistance Program (A)	X	X			
20.303 Grants-in-Aid for Railroad Safety—State Participation (B)	X	X			X
20.308 Local Rail Service Assistance (A)	X	X			X
20.500 Urban Mass Transportation Capital Improvement Grants (B)	X	X	X	X	X
20.502 Urban Mass Transportation Grants for University Research and Training (B)				X	X
20.503 Urban Mass Transportation Managerial Training Grants (B)	X	X			X
20.505 Urban Mass Transportation Technical Studies Grants (B)	X	X			X
20.507 Urban Mass Transportation Capital and Operating Assistance Formula Grants (A)	X	X	X		X
20.509 Public Transportation for Nonurbanized Areas (A)	X	X		X	X
20.511 Human Resource Programs (B,L)	X	X		X	X
20.512 Urban Mass Transportation Technical Assistance (B,L,M)	X	X	X	X	X
20.513 Capital Assistance Program for Elderly and Handicapped Persons (B)	X	X		X	X
20.600 State and Community Highway Safety (A)	X	X			X
20.700 Pipeline Safety (A)	X	X			X
20.800 Construction—Differential Subsidies (C)			X		
20.801 Development and Promotion of Ports and Intermodal Transportation (B,K,L)					X
20.806 State Marine Schools (C,I)		X			
20.902 University Transportation Centers Program (B)				X	X

DEPARTMENT OF THE TREASURY

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1237
21.006 Tax Counseling for the Elderly (C)				X	

APPALACHIAN REGIONAL COMMISSION

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1237
23.002 Appalachian Supplements to Federal Grant-in-Aid (Community Development) (B)	X	X	X		
23.003 Appalachian Development Highway System (B)	X	X	X		
23.004 Appalachian Health Programs (B)	X	X	X		
23.005 Appalachian Housing Project Planning Loan, Technical Assistance Grant and Site Development and Off-Site Improvement Grant: State Appalachian Housing Programs (B)		X	X	X	
23.008 Appalachian Local Access Roads (B)	X	X	X		
23.009 Appalachian Local Development District Assistance (B)	X	X			
23.010 Appalachian Mine Area Restoration (B)	X	X	X		
23.011 Appalachian State Research, Technical Assistance, and Demonstration Projects (B)	X	X		X	
23.012 Appalachian Vocational and Other Education Facilities and Operations (B)	X	X	X		
23.013 Appalachian Child Development (B)	X	X			
23.017 Appalachian Special Transportation Related Planning, Research and Demonstration Program (B)	X	X		X	

Note: Except for 23.005, 23.009, 23.011, and 23.017, administration of these grants is not in the Commission but in the appropriate program agency—e.g., 23.003 is handled by DOT. For 23.002, Appalachian Supplements to Federal Grants-in-aid, which can provide all or any portion of the Federal contribution under certain defined grant-in-aid programs, coverage is determined by the provisions applicable to the basic grant-in-aid program.

FEDERAL MEDIATION AND CONCILIATION SERVICE

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.1237
34.002 Labor—Management Cooperation (B)	X	X		X	

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.12372
GENERAL SERVICES ADMINISTRATION					
39.002 Disposal of Federal Surplus Real Property (H)					X
NATIONAL CREDIT UNION ADMINISTRATION					
44.002 Community Development Revolving Loan Program for Credit Unions (E)					X
NATIONAL FOUNDATION ON THE ARTS AND THE HUMANITIES					
45.001 Promotion of the Arts—Design Arts (B,C)	X	X		X	
45.002 Promotion of the Arts—Dance (B,C)	X	X		X	
45.003 Promotion of the Arts—Arts in Education (B)	X	X		X	X
45.004 Promotion of the Arts—Literature (B)	X	X		X	
45.005 Promotion of the Arts—Music (B)	X			X	
45.006 Promotion of the Arts—Media Arts: Film/Radio/Television (B)	X			X	
45.007 Promotion of the Arts—State Programs (A,B,K)	X	X			X
45.008 Promotion of the Arts—Theater (B)	X	X		X	
45.009 Promotion of the Arts—Visual Arts (B)	X	X		X	
45.010 Promotion of the Arts—Expansion Arts (B)	X			X	
45.011 Promotion of the Arts—Inter-Arts (B)	X			X	
45.012 Promotion of the Arts—Museums (B)	X	X		X	
45.013 Promotion of the Arts—Challenge Grants (B)	X			X	
45.014 Promotion of the Arts—Opera-Musical Theater (B)	X	X		X	
45.015 Promotion of the Arts—Folk Arts (B)	X			X	
45.022 Promotion of the Arts—Advancement Grants (B)	X			X	
45.023 Promotion of the Arts—Local Programs (B)	X	X		X	X
45.104 Promotion of the Humanities—Humanities Projects in Media (B)	X	X		X	
45.113 Promotion of the Humanities—Public Humanities Projects (B)	X	X		X	
45.116 Promotion of the Humanities—Summer Seminars for College Teachers (B)		X		X	
45.122 Promotion of the Humanities—Regrants/Centers for Advanced Study (B)	X	X		X	
45.124 Promotion of the Humanities—Reference Materials/Access (B)	X	X		X	
45.125 Promotion of the Humanities—Humanities Projects in Museums and Historical Organizations (B)	X	X		X	
45.127 Promotion of the Humanities—Elementary and Secondary Education in the Humanities (B)	X	X		X	
45.129 Promotion of the Humanities—State Programs (B)				X	
45.132 Promotion of the Humanities—Texts/Publication Subvention (B)	X	X		X	
45.133 Promotion of the Humanities—Interpretive Research/Humanities, Science and Technology (B)	X	X		X	
45.134 Promotion of the Humanities—Regrants/Conferences (B)	X	X		X	
45.137 Promotion of the Humanities—Humanities Projects in Libraries and Archives (B)	X	X		X	
45.140 Promotion of the Humanities—Interpretive Research/Projects (B)	X	X		X	
45.145 Promotion of the Humanities—Reference Materials/Tools (B)	X	X		X	
45.146 Promotion of the Humanities—Texts/Editions (B)	X	X		X	
45.147 Promotion of the Humanities—Texts/Translations (B)	X	X		X	
45.148 Promotion of the Humanities—Regrants Program/International Research (B)	X	X		X	
45.149 Promotion of the Humanities—Office of Preservation (B)	X	X		X	
45.150 Promotion of the Humanities—Higher Education in the Humanities (B)	X	X		X	
45.151 Promotion of the Humanities—Summer Seminars for School Teachers (B)		X		X	
45.153 Promotion of the Humanities—Regrants Program/Selected Areas (B)	X	X		X	
45.154 NEH/Reader's Digest Teacher-Scholar Program (B)	X	X		X	
45.301 Institute of Museum Services (B,C,D)	X	X		X	
NATIONAL SCIENCE FOUNDATION					
47.009 Graduate Research Fellowships (B)				X	
47.041 Engineering Grants (B)				X	
47.049 Mathematical and Physical Sciences (B)				X	
47.050 Geosciences (B)				X	
47.051 Biological, Behavioral, and Social Sciences (B)				X	
47.053 Scientific, Technological, and International Affairs (B)				X	
47.066 Teacher Preparation and Enhancement (B)				X	X
47.067 Materials Development, Research, and Informal Science Education (B)				X	X
47.068 Studies and Program Assessment (B)				X	X
47.069 Research Initiation and Improvement (B)				X	
47.070 Computer and Information Science and Engineering (B)				X	
47.071 Undergraduate Science, Engineering, and Mathematics Education (B)				X	

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47.072 Young Scholars (B)				X	X
SMALL BUSINESS ADMINISTRATION					
59.007 Management and Technical Assistance for Socially and Economically Disadvantaged Businesses (B)	X	X			X
59.037 Small Business Development Center (B,L)		X		X	X
TENNESSEE VALLEY AUTHORITY					
62.001 National Fertilizer Development (H,I,K,L)					X
62.004 Tennessee Valley Region—Economic Development (K,L)					X
62.005 Tennessee Valley Region—Natural Resources Development (K,L)					X
62.006 Tennessee Valley Region—Valley Agricultural Institute (K,L)					X
VETERANS ADMINISTRATION					
64.005 Grants to States for Construction of State Home Facilities (B)	X	X	X		X
64.201 National Cemeteries (J)					X
64.203 State Cemetery Grants (B)	X	X	X		X
ENVIRONMENTAL PROTECTION AGENCY					
66.001 Air Pollution Control Program Support (A)	X	X			X
66.003 Air Pollution Control Manpower Training (B)		X		X	
66.418 Construction Grants for Wastewater Treatment Works (B)	X	X	X		X
66.419 Water Pollution Control—State and Interstate Program Support (A)	X	X			X
66.432 State Public Water System Supervision (A)	X	X			X
66.433 State Underground Water Source Protection (A)	X	X			X
66.435 Water Pollution Control—Lake Restoration Cooperative Agreements (B)	X	X	X		X
66.438 Construction Management Assistance (A)	X	X			X
66.454 Water Quality Management Planning (A)	X	X			X
66.456 National Estuary Program (B)	X	X		X	X
66.459 Nonpoint Source Reservation (A)	X	X			X
66.500 Environmental Protection—Consolidated Research (B)	X	X	X	X	X
66.501 Air Pollution Control Research (B)	X	X	X	X	X
66.502 Pesticides Control Research (B)	X	X	X	X	X
66.504 Solid Waste Disposal Research (B)	X	X	X	X	X
66.505 Water Pollution Control—Research, Development, and Demonstration (B)	X	X	X	X	X
66.506 Safe Drinking Water Research and Demonstration (B)	X	X	X	X	X
66.507 Toxic Substances Research (B)	X	X	X	X	X
66.508 Senior Environmental Employment Program (B)				X	X
66.600 Environmental Protection Consolidated Grants—Program Support (A)	X	X			X
66.700 Pesticides Enforcement Program (B)	X	X			X
66.701 Toxic Substances Compliance Monitoring Cooperative Agreements (B)	X	X			X
66.702 Asbestos Hazards Abatement (Schools) Assistance (B,E)	X	X			X
66.703 Asbestos Inspection and Management Plan Assistance (B)	X	X			X
66.801 Hazardous Waste Management State Program Support (A)	X	X			X
66.802 Hazardous Substance Response Trust Fund (B)	X	X			X
66.804 State Underground Storage Tanks Program (B)	X	X			X
66.805 Underground Storage Tank Trust Fund Program (B)	X	X			X
66.806 Superfund Technical Assistance Grants for Citizen Groups at Priority Sites (B)				X	X
ACTION					
72.001 Foster Grandparent Program (B,K)	X	X		X	X
72.002 Retired Senior Volunteer Program (B)	X	X		X	X
72.003 Volunteers in Service to America (J)					X
72.005 Service-Learning Programs (B,L,M)	X	X		X	X
72.008 Senior Companion Program (B)	X	X		X	X
72.010 Minigrant Program (B)	X	X		X	
72.011 State Office of Voluntarism (B)	X	X			
72.012 Volunteer Demonstration Program (B)	X	X		X	
72.013 Technical Assistance Program (B,L)	X	X		X	
NUCLEAR REGULATORY COMMISSION					
77.003 Enhance Technology Transfer and Dissemination of Nuclear Energy Process and Safety Information (B)	X	X		X	

PROGRAM DESCRIPTION	A-87	A-102	EIS	A-110	E.O.12372
DEPARTMENT OF ENERGY					
81.011 University Reactor Sharing and Fuel Assistance (B.H)				X	
81.022 Used Energy-Related Laboratory Equipment Grants (H)				X	
81.036 Energy-Related Inventions (B.I.K.L)				X	
81.041 State Energy Conservation (A)	X	X			X
81.042 Weatherization Assistance for Low-Income Persons (A)	X	X		X	X
81.047 Pre-Freshman Engineering (B)				X	
81.049 Basic Energy Sciences, High Energy and Nuclear Physics, Magnetic Fusion Energy, Health and Environmental Research, Program Analysis and Field Operations Management (B)	X	X		X	X
81.050 Energy Extension Service (A)	X	X			X
81.052 Energy Conservation for Institutional Buildings (A)	X	X		X	X
81.057 University Coal Research (B)				X	
81.065 Nuclear Waste Disposal Siting (B.C)	X	X		X	
81.077 University Research Instrumentation (B)				X	
81.078 Industrial Energy Conservation (B)				X	
81.079 Biofuels and Municipal Waste Technology and Regional Programs (B)	X	X		X	
81.080 Energy Policy, Planning and Development (B)	X			X	
81.081 Energy Task Force for the Urban Consortium (B)	X	X		X	
81.086 Conservation Research and Development (B)	X	X		X	
81.087 Renewable Energy Research and Development (B)	X	X		X	
81.089 Fossil Energy Research and Development (B)	X	X		X	
81.092 Remedial Action and Waste Technology (B)	X			X	
81.093 Nuclear Energy Policy, Planning and Development (B)	X			X	
81.094 Minority Educational Institution Assistance (B)				X	
81.095 Nuclear Energy, Reactor Systems, Development, and Technology (B)	X	X		X	
81.096 Innovative Clean Coal Technology (B)	X	X		X	
FEDERAL EMERGENCY MANAGEMENT AGENCY					
83.403 Emergency Management Institute—Field Training Program (A.B.M)		X			X
83.410 Community-Based Anti-Arson Program (B)		X			
83.502 Acquisition of Flood-Damaged Structures (H)					X
83.503 Civil Defense—State and Local Emergency Management Assistance (A)	X	X			X
83.504 Other State and Local Direction, Control and Warning (B)	X	X			X
83.505 State Disaster Preparedness Grants (B)	X	X			X
83.509 Facility Survey, Engineering and Development (J)					X
83.512 State and Local Emergency Operating Centers (B)	X	X	X		X
83.513 State and Local Warning and Communication Systems (B)	X	X			X
83.514 Population Protection Planning (B)	X	X			X
83.516 Disaster Assistance (B.I.J)	X	X			X
83.519 Hazard Mitigation Assistance (B)	X	X			
83.520 Hurricane Preparedness Grants (B)	X	X			X
83.521 Earthquake Hazards Reduction Grants (B)	X	X			X
83.522 Radiological Defense (B.J)	X	X			X
DEPARTMENT OF EDUCATION					
84.002 Adult Education—State-Administered Program (A)	X	X			X
84.003 Bilingual Education (B.C)	X	X		X	X
84.004 Civil Rights Technical Assistance and Training (B)	X	X		X	X
84.007 Supplemental Educational Opportunity Grants (C)				X	
84.009 Education of Handicapped Children in State Operated or Supported Schools (A)	X	X			
84.011 Migrant Education—Basic State Formula Grant Program (A)	X	X			
84.014 Follow Through (B)	X	X		X	X
84.015 National Resource Centers and Fellowships Program for Language and Area or Language and International Studies (B)				X	
84.016 Undergraduate International Studies and Foreign Language Programs (B)				X	
84.017 International Research and Studies (B)	X	X		X	
84.020 Fulbright-Hays Training Grants—Foreign Curriculum Consultants (B.J)	X	X		X	
84.021 Fulbright-Hays Training Grants—Group Projects Abroad (B)	X	X		X	
84.023 Handicapped—Innovation and Development (B)	X	X		X	
84.024 Handicapped Early Childhood Education (B)	X	X		X	X
84.025 Handicapped Education—Deaf-Blind Centers (B)	X	X		X	X
84.026 Handicapped Media Services and Captioned Films (B.C)	X	X		X	X
84.027 Handicapped—State Grants (A)	X	X			X
84.028 Handicapped Regional Resource and Federal Centers (B)	X	X		X	X

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84.029 Handicapped Education—Special Education Personnel Development (B)	X	X		X	
84.030 Clearinghouses for the Handicapped Program (B)	X	X		X	X
84.031 Higher Education—Institutional Aid (B)				X	
84.033 College Work-Study Program (C)				X	
84.034 Library Services (A)		X			X
84.035 Interlibrary Cooperation and Resource Sharing (A)	X	X			X
84.036 Library Career Training (B)	X	X			X
84.037 National Defense/National Direct/Perkins Loan Cancellations (C.D)				X	
84.038 Perkins Loans (C)				X	
84.039 Library Research and Demonstration (B)	X	X			X
84.040 Impact Aid—Construction (B)	X	X	X		X
84.041 Impact Aid—Maintenance and Operation (D)	X	X			X
84.048 Vocational Education—Basic Grants to States (A)	X	X			X
84.049 Vocational Education—Consumer and Homemaking Education (A)	X	X			X
84.051 National Vocational Education Research (B)	X	X		X	
84.053 Vocational Education—State Councils (A)	X	X			X
84.055 Higher Education—Cooperative Education (B)				X	
84.060 Indian Education—Formula Grants to Local Educational Agencies and Tribal Schools (B)	X	X			X
84.061 Indian Education—Special Programs and Projects (B)	X	X			X
84.062 Indian Education—Adult Indian Education (B)	X	X			X
84.064 Higher Education—Veterans Education Outreach Program (C)				X	
84.072 Indian Education—Grants to Indian Controlled Schools (B)		X			
84.073 National Diffusion Network (B)					X
84.077 Bilingual Vocational Training (B.C)	X	X		X	X.
84.078 Postsecondary Education Programs for Handicapped Persons (B)	X	X		X	X
84.083 Women's Educational Equity (B)	X	X		X	X
84.086 Handicapped Education—Severely Handicapped Program (B)	X	X		X	X
84.087 Indian Education—Fellowships for Indian Students (B)		X			
84.091 Strengthening Research Library Resources (B)	X	X			X
84.094 Patricia Roberts Harris Fellowships (B)				X	
84.097 Law School Clinical Experience Program (B)				X	
84.099 Bilingual Vocational Instructor Training (B.C)	X	X		X	X
84.100 Bilingual Vocational Materials. Methods, and Techniques (B)	X	X		X	X
84.101 Vocational Education—Indian and Hawaiian Natives (B)	X	X			
84.116 Fund for the Improvement of Postsecondary Education (B)				X	
84.117 Educational Research and Development (B)	X			X	
84.120 Minority Science Improvement (B)				X	
84.122 Secretary's Discretionary (B)	X				
84.123 Law-Related Education (B)	X	X		X	X
84.124 Territorial Teacher Training Assistance Program (B)	X	X			X
84.126 Rehabilitation Services—Basic Support (A)	X	X			X
84.128 Rehabilitation Services—Service Projects (B)	X			X	X
84.129 Rehabilitation Training (B)	X			X	
84.132 Centers for Independent Living (B)	X	X		X	X
84.133 National Institute on Disability and Rehabilitation Research (B)	X	X		X	
84.141 Migrant Education—High School Equivalency Program (B)		X		X	
84.142 Housing and Other Educational Facilities Loans (E)					X
84.144 Migrant Education—Interstate and Intrastate Coordination Program (B)	X				
84.145 Federal Real Property Assistance Program (H)			X		X
84.146 Transition Program for Refugee Children (A)	X	X			X
84.149 Migrant Education—College Assistance Migrant Program (B)		X		X	
84.153 Business and International Education (B)				X	
84.154 Public Library Construction (A)		X			X
84.155 Removal of Architectural Barriers to the Handicapped (A)	X	X	X		
84.158 Secondary Education and Transitional Services for Handicapped Youth (B)	X	X		X	X
84.159 Handicapped—Special Studies (B)	X	X		X	X
84.160 Training Interpreters for Deaf Individuals (B)	X			X	
84.161 Client Assistance for Handicapped Individuals (A)	X	X			X
84.162 Emergency Immigrant Education (A)	X	X			
84.163 Library Services for Indian Tribes and Hawaiian Natives (B)		X			X
84.164 State Grants for Strengthening the Skills of Teachers and Instruction in Mathematics, Science, Foreign Languages, and Computer Learning (A)		X			X
84.165 Magnet Schools Assistance (B)	X	X			X
84.167 Library Literacy (B)	X	X			X
84.168 Secretary's Discretionary Program for Mathematics, Science, Computer Learning, and Critical Foreign Languages (B)	X	X			
84.169 Comprehensive Services for Independent Living (A)	X	X			X

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84.172 Construction, Reconstruction, and Renovation of Academic Facilities (B)			X	X	
84.173 Handicapped—Preschool Grants (A)	X	X			X
84.174 Vocational Education—Community Based Organizations (A)	X	X			X
84.176 Paul Douglas Teacher Scholarships (A)		X			X
84.177 Rehabilitation Services—Independent Living Services for Older Blind Individuals (B)	X	X			
84.178 Leadership in Educational Administration Development (B)		X		X	X
84.180 Technology, Educational Media and Materials for the Handicapped (B)	X	X		X	
84.181 Handicapped Infants and Toddlers (B)	X	X			X
84.184 National Program for Drug-Free Schools and Communities (B)	X	X			
84.186 Drug-Free Schools and Communities—State Grants (A)	X	X			X
84.187 Supported Employment Services for Individuals with Severe Handicaps (A)	X	X			X
84.188 Drug-Free Schools and Communities—Regional Centers (B)	X	X		X	X
84.191 National Adult Education Discretionary Program (B)	X	X		X	
84.192 Adult Education for the Homeless (A)		X		X	
84.193 Demonstration Centers for the Retraining of Dislocated Workers (B)	X	X		X	
84.194 Bilingual Education Support Services (B)	X			X	X
84.195 Bilingual Education Training Grants (B)	X			X	X
84.196 State Activities—Education of Homeless Children and Youth (A)	X	X			X
84.197 College Library Technology and Cooperation Grants (B)	X	X		X	X
84.198 Workplace Literacy Partnership (B)	X	X		X	
84.199 Vocational Education Cooperative Demonstration (B)	X	X		X	X
84.200 Graduate Assistance in Areas of National Need (B)				X	
84.201 School Dropout Demonstration Assistance (B)	X	X		X	
84.202 Grants to Institutions to Encourage Minority Participation in Graduate Education (B)				X	
84.203 Star Schools Program (B)	X	X		X	X
NATIONAL ARCHIVES AND RECORDS ADMINISTRATION					
89.003 National Historical Publications and Records Grants (B)		X		X	X
COMMISSION ON THE BICENTENNIAL OF THE U.S. CONSTITUTION					
90.001 Bicentennial Educational Grant Program (B)	X	X		X	

VIII. Summary

The Massachusetts Nonpoint Source Management Plan contained herein has been carefully crafted to optimize present capabilities and expertise. There is no doubt that successful implementation of this plan over the next four years depends upon strong leadership from the EOEA and DEQE management and close cooperation from all the various federal, state, regional and environmental groups involved. There is commitment from the leadership and there does exist a spirit of cooperation among the various government and nongovernment agencies. A third important ingredient for successful implementation of the plan is an identified agency or office which will provide the day-to-day and year-to-year driving force behind the plan. This agency is the DWPC/TSB located in Westborough. Personnel assigned to the Nonpoint Source Program will coordinate the management plan and lend its support whenever and wherever it is needed. Financial resources are not abundant and in many circumstances implementation will have to be achieved under current capabilities. Portions of the plan (e.g., targeted watershed projects; Section III.B.2.) will depend upon the availability of financial resources. In the final analysis, however, the success of the Nonpoint Source Plan will depend upon public education and awareness of the issues. Priority has been placed in this area.

The state of Massachusetts also recognizes the importance of working in concert with the EPA to effectuate meaningful controls of nonpoint sources of pollution to reach the goal of acceptable water quality in the waters of the Commonwealth. We appreciate the role that EPA has under its various authorities to share in the leadership role of setting priorities for nonpoint source pollution control. A close partnership between the federal and state agencies can and will go a long way in ensuring successful implementation of this plan.

This management plan is aggressive and optimistic. Experience has shown that execution of any plan depends upon the people involved and the resources available. There will undoubtedly be some shifts in priority in terms of strict adherence to the milestone schedule as circumstances warrant. The annual report to the EPA and the midyear review process will allow the state and EPA to review progress and, if necessary, adjust priorities.

There is little doubt that as the states progress in their efforts to control and reduce point sources of pollution, the issue and magnitude of nonpoint sources of pollution will become self-evident. Congress realized this by amending the Clean Water Act to include a nonpoint source program. Massachusetts embraces this initiative and by means of this management plan sets forth to control nonpoint sources of pollution with a commitment to preserving and enhancing the Commonwealth's water resources.

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